DOOMSDAY DEVICE: RETHINKING THE DEPLOYMENT OF THE 'ACHIEVEMENT GAP' IN EQUITY ARGUMENTS

AMY NOELLE PARKS

> *"We were worried about a Doomsday gap " (the Russian Ambassador in Dr. Strangelove, commenting on his country's fear of being left behind in the race to create a weapon capable of total, automated destruction)*

In Stanley Kubrick's (1964) movie, *Dr. Strangelove,* the entire world was plunged into nuclear winter when a wacky American general sent a squadron of bombers to attack the Soviet Union, triggering a Doomsday device that could not be shut down. The annihilation of all life on Earth occurred because of, rather than despite, multiple policies aimed at preventing such an occurrence. Driven by fear of a weapons gap, both countries produced more and more weapons, while implementing policies designed to deter their opponent from ever putting these weapons to use. However, each of the proposed solutions to the weapons gap – the Doomsday machine, with its automated total destruction, the emergency back-up plan to launch planes that cannot be recalled, and the locking down of communication to military bases to prevent sabotage – all contributed to the horrible (if comic) climax. In the end, it was not merely the atomic bombs themselves that were dangerous, but the social practices designed to manage the bombs.

In *Dr. Strangelove,* fear of increasingly scary weapons contributed to a discursive environment where it made sense to produce more and more, increasingly scary weapons. In current U.S. mathematics education discourse, the increasing use of statistics about the achievement gap to make arguments for educational change contributes to a discursive environment where it makes sense to produce more statistics about the achievement gap. Following Kubrick's movie, I argue that this current focus in mathematics education on measuring, reducing, and explaining the achievement gap is dangerous and can be counter-productive to the equity-oriented arguments that those mobilizing "gap" language want to make. By focusing on the identification of demographic groups of children who have trouble in mathematics and descriptions of ways their difficulties might be remediated (*e.g.*, NRC, 2005; NCTM, 2000), the gap-based equity conversation reinforces inequitable ways of thinking and acting – just as producing and managing the Doomsday device worked against the goal that inspired *its* creation: preventing the end of the world.

The purpose of this essay is to undermine the dominance of the achievement gap metaphor in equity arguments and to provide some alternatives for doing equity work in mathematics education. In making this argument, I do not deny that people experience inequities, that these inequities must be remedied, or that conscious work to close the achievement gap can be productive. Rather, I point to some of the unintended consequences of gap-oriented equity arguments and suggest some additional ways of doing equity work. To do this, first, I examine the achievement gap in light of poststructural theories about the production of knowledge, identifying ways in which the achievement gap has been produced through research about it and examining some of the ways this production has contributed to our thinking and writing about students. Next, I consider two possibilities for doing equity-oriented research that could cast the achievement gap and similar constructs in new lights: writing under erasure and genealogy. I use both of these strategies to model some possible poststructural approaches to equity work.

The production of the achievement gap

In drawing on poststructural theories and approaches, I am not referencing an explicit set of principles or a particular canon of writers. Rather, I am evoking what Walshaw (2001, p. 472) has called a "constellation of theoretical positions" articulated in response to structural conceptions of power and Enlightenment visions of progress. Broadly, these theories see power operating in discursive communities in ways that work to define what the truth is in particular historical moments. More specifically, I draw on Foucault's (1980) discussion of "power/knowledge." Foucault used a hyphen in this phrase to encourage readers not to think of power and knowledge as two separate things. In one explanation of his thinking, Foucault turned around Karl Von Clausewitz's famous remark that war is the continuation of politics by other means. In contrast, Foucault wrote that politics is the continuation of war by other means.

> [I]t implies that the relations of power that function in a society such as ours essentially rest upon a definite relation of forces that is established at a determinate, historically specifiable moment, in war and by war. . . . The role of political power, on this hypothesis, is perpetually to reinscribe this relation through a form of unspoken warfare; to re-inscribe it in social institutions, in economic inequalities, in language, in the bodies themselves of each and every one of us. (Foucault, 1980, p. 90)

For the Learning of Mathematics **29**, 1 (March, 2009)
FLM Publishing Association, Edmonton, Alberta Canada

What does this have to do with knowledge? When we, as researchers, make claims about what we "know," we exercise power - that is, research-based best practices are ways of reinscribing certain relations of power within the social institution of the schools What we accept as *known* today is also a product of the ways that power has been exercised in the past - that is, Americans *know* about the American Revolution rather than the American Rebellion because of power relations established at a specific moment "in war and by war." Americans *know* George Washington is a hero and not a terrorist because of these power relations and each time they tell the story, use a dollar with Washington's picture, or view his face on Mount Rushmore, they inscribe the story a bit deeper. All of this means that the ways in which we speak/think/act create words, categories, and ideas that function as truth. Recognizing the conflation of knowledge and power has implications for how we think as researchers about the creation of knowledge. Following Foucault, truth is not an absolute we uncover, but a way of exercising power.

If theories, facts, and interpretations become true through constant reinscription in discourse, then researchers have ethical obligations both to analyze the ideas being reinscribed in their own communities and to consider the stories that their own work will make true This is a different ethical obligation than that required by positivist-oriented theories, which ask that researchers *tell* the truth through the honest and accurate representation of data (*e.g.*, Campbell & Stanley, 1963); and it is different from the obligations required by structuralist theories, which demand that researchers *reinterpret* current truths, particularly in light of social and political inequities (*e.g.*, LeCompte, 1995) Theorists writing with Foucault (*e.g.*, Walkerdine, 1988; Walshaw, 2001) see research as a *will-to-truth* This is not so much the production of knowledge that socio-cultural theorists talk about, but the recognition that all knowledge is the exercise of power.

Following Foucault, writing and research about the achievement gap can be seen as working to produce a measurable phenomenon rather than as describing a pre-existing reality A recent ERIC search for documents with the phrase in the abstract turned up more than 500 texts; a Google search produced over a half a million hits This is reinscription on its most basic level Contributing to the production of this phenomenon is the myriad of achievement gap definitions, such as this one by NCTM (2005), which defined the achievement gap as:

> disparities among groups of students usually identified (accurately or not) by racial, ethnic, linguistic, or socio-economic status with respect to a variety of measures, including attrition and enrollment rates, alienation from school and society, attitudes toward mathematics, and test scores (p 4)

Measuring the achievement gap etches this particular relation of power into our social institutions, our language, and our bodies more deeply. What we measure (alienation, attitude and math test scores), how we measure (multiple choice, surveys, short answer) and what we report (scores by race and gender) are technologies that allow educators to exercise power relations that were established "in war and by war." The history of these power relations includes both instances of physical violence, such as acts committed during slavery and the U.S. Civil Rights Movement, and acts of symbolic violence, such as the denial of voting rights Current descriptions of ethnic and gender groups carry these historical echoes and can remind some individuals of their inferiority (identifiable by "racial, ethnic, linguistic, or socio-economic status," *ibid*) and others of their accomplishments. Every time someone mentions the achievement gap these hierarchies are called to mind and reinforced. In fact, it is because of these relations of power that NCTM can refer vaguely to racial, ethnic, linguistic, and socio-economic categories and we all know who's in trouble. (Hint: it's not upper-class white males.)

These technologies - the way scores are (or are not) disaggregated, the methods of measurement, and the content being measured - are not innocent, neutral or natural; they do not simply measure what is true; they produce it Typically, scores are not reported by marital status of parents, sibling order, or teacher's level of education. We choose which categories to make important. The National Assessment of Educational Progress, which has been given periodically to U.S children in the 4th, 8th, and 12th grades since 1969, disaggregates data in a variety of ways, including race, gender, kindergarten attendance, mothers' and fathers' work outside the home, parents' education levels, and number of siblings. However, some of these variables receive far more attention than others For example, in the State Snapshots (U.S Department of Education, 2007), NAEP mathematics scores are reported only by students' race, gender and eligibility for free- or reduced-price lunches Emphasizing these variables works to shape researchers' and politicians' discussions of who is ahead and who needs to catch up.

Although there is a significant gap in performance on the NAEP mathematics test between students who have a college graduate as a parent and students whose parents have not finished high school (USDOE, 2007), far more has been written about gaps concerning gender, race, and income These often-discussed factors can become accepted explanations for testing gaps in ways that other factors do not. For example, when NAEP data showed a statistical advantage to private schools over public schools, Braun, Jenkins and Grigg (2006) reinterpreted the data by performing a regression analysis, which demonstrated that much of the test score gap could be explained by characteristics of students, such as race and identified disability. An analysis like this refuses to let public schooling become an explanation for low scores but allows certain student characteristics to do so. Because NAEP collects only some kinds of data, only some kinds of these regression analyses are possible. So while it is possible to break down the category of "public school" into particular student characteristics, it is not possible to break down a category like race into other factors that may be associated with test performance, such as experiences with racism in the school, relationships with teachers, or attitudes toward testing.

Research on stereotype threat has helped to show the ways in which the experience of testing produces certain

kinds of scores that may reveal as much as about test takers' social positioning as about their mathematical knowledge For example, in one study, researchers told European American males that Asian Americans typically outperform whites in mathematics Then researchers gave these men a challenging math test These participants performed significantly worse on the test than men who had taken the test without having this stereotype invoked beforehand (Aronson *et al.*, 1998) For minority students, the act of taking a standardized test may work to invoke stereotypes about performance even without an explicit reminder because phenomena like the achievement gap are so widely accepted as real Thus, the achievement gap works in two ways in these situations First, its acceptance as a real phenomenon impacts student performance on tests, and second, the tests then go on to produce evidence, in the form of test scores, that the phenomenon is, in fact, real That's power/knowledge

Possibilities for other kinds of equity work

Recognizing the ways in which the mobilization of the achievement gap in equity arguments has reinforced rather than worked against hierarchical thinking about students related to racial, class, and gender categories requires researchers interested in equity to think about other ways of making arguments In my own writing, I no longer want to pursue an equity agenda solely through analysis of the size of the achievement gap, the reasons for it, or the way to close it Although exploration of these issues can highlight structural inequities, these explorations can also reinscribe the relations of power embedded in the notion of the achievement gap by calling to mind hierarchies or suggesting that race determines achievement

At the same time, I do not feel comfortable pursuing a research agenda that does not explicitly address historical inequities Resources have not been distributed fairly Racism, sexism and classism have been common ways of exercising power, and I have no desire for my work to give aid to those who would argue that this is not the case In the second part of this essay, I'd like to describe two techniques borrowed from poststructural philosophers that may offer possibilities for mathematics educators who want to address inequity without reinscribing hierarchical descriptions of race, gender, and class

Writing under erasure

This first technique, which French philosopher Derrida called writing "under erasure" (Derrida, 1976, p 60), involves simultaneously (or at least in sequence) writing an argument for and against an idea Writing under erasure can be deployed when the concept under consideration is both necessary and rejected For instance, when talking about the relationship between the sign and the signified, Derrida wrote: "But we cannot do without the concept of the sign, for we cannot give up this metaphysical complicity without also giving up the critique we are directing against this complicity" (Derrida, 1978, p 281) Here he argued that we cannot talk about the pointlessness of differentiating between the sign (*e g*, the written word "child") and the signified (*e g*, the small humans we see in schoolyards) without necessarily calling into play the concept of signs (as separate from signified) Derrida sometimes signaled erasure by leaving a word that had been crossed out within the text – showing it to be both necessary and challenged – but there are other ways

Although she did not call it writing under erasure, Ladson-Billings has used this strategy to deal with the complexity involved in notions of culture In writing about culturally relevant teaching, she described African American culture as valuing "rhythm, orality, communalism, and spirituality" (Ladson-Billings, 1997, p 700) Then at the bottom of the page, she wrote in a footnote: "I do not mean to imply there is one monolithic African American culture" and "It is important that this notation not be read as the stereotypical 'all Black people got rhythm.'" Like Derrida, she is both calling on a notion of culture and crossing it out Rochelle Gutiérrez (2007, p 42) made a similar move when she deployed the phrase "strategic essentialism" (coined by literary critic Gayatri Spivak) in a discussion of equity In Gutierrez's use, the phrase acknowledges that sometimes to make an argument it may be necessary to talk about the mathematical performance of girls or African-Americans, but at the same time, carries a reminder of how problematic this strategy is Any categorization of students by race, gender, or class, even for purposes of an equity argument, reduces individuals to just one of these categories and contributes to thinking about these groups as monolithic (and often as ranked)

The moves described above are relatively small, but researchers in mathematics education might begin to imagine more significant ways of writing under erasure in discussions of the achievement gap and equity In their book about women living with HIV/AIDS, Lather and Smithies (1997) demonstrated how an entire text could be written in ways that highlight, rather than minimize, contradictory claims to truth Throughout most of the book, the top two-thirds of the page are devoted to transcripts of women talking about their experiences, while the bottom third is reserved for Lather and Smithies' commentaries In addition, throughout the book, small text boxes are used to report statistics, medical information, and the comments of individual women Thus, rather than telling one cohesive story, the book portrays sometimes conflicting perspectives that challenge the reader to live with discrepancies instead of resolving them.

Using similar juxtapositions, researchers in mathematics education could add complexity to equity discussions by presenting challenges to testing data while still writing about it For example, ethnographic descriptions of minority students' competent and enthusiastic performances might be run along side reports of testing data, such as in Table 1

Writing under erasure like this, and in other ways, has the potential to inject uncertainty into discussions of statistics When test score data is reported, discussions of the way questions were chosen, the contexts in which they were asked, and the way scores were disaggregated can be included in a variety of representations as a means to call attention to which variables researchers chose to make important and how they chose to measure them Textual moves that expose contradictions remind readers that scores on tests are produced through a variety of human interactions and serve to make constructs like the achievement gap more permeable

Studies of kindergarteners have shown that while 66 percent of white children pass tests on reading numerals, counting past 10, sequencing, and comparing, only 42 percent of African American and 44 percent of Hispanic children pass similar tests (NRC, 2005) Similarly, other research has shown that poor children have a harder time solving problems mentally than more well-off children do (Jordan, Huttenlocher & Levine, 1994); and that African American first-graders do not perform as well on tests of cognitive development in mathematics as European American children (Cooper and Schleser, 2006)	*Recently, I spent a morning in a public preschool in rural Georgia All of the students received free lunch and most were African American During center time, four students gathered at a table to make designs by pressing different colored pegs into screens Spontaneously, Shantay began to count hers, correctly counting from 1–32, with a brief hesitation after 29 Tameka looked at Shantay's pegs, which covered about a quarter of the screen, and then at her own, which covered about a third of the screen "I got more," she said Shantay looked at them for a moment, and then agreed before reaching for more herself To Tameka, she said, "I'm going to beat you " I asked Shantay how many she had in her hand She looked at me a moment and then began to put the pegs in her screen without answering*
The ethnographic account in the right column raises questions about the ability of the studies in the left column to accurately describe children's mathematical performance Shantay's competent counting in play with Tameka along with her refusal to engage with me (a white university researcher asking her to perform for my own purposes) puts the reports of test scores into another context As in Lather and Smithes' work, it is not that one side of the table represents a true account and the other does not, but that these multiple interpretations exist simultaneously The ethnographic account reminds us that the data gathered about children's performance occurred in institutional contexts where both researchers and children exercised power amid discourses of race, gender, age, and language, while the statistical account on the left calls attention to structural patterns and inequities	

Table 1: Mathematical competence in early childhood education

Genealogy

The second technique I want to suggest is that of broadening the research traditions used to study problems related to equity in mathematics Statistical analyses and ethnographic descriptions have both made significant contributions to the field's understanding of what goes on in schools and of how particular practices affect particular children However, by calling on social science traditions to make truth claims, both also make current power structures more real That is, this research adds to a "regime of discourses" (Foucault, 1978, p 27) that portrays current hierarchies as natural and inevitable It may be easy to see the ways that statistical descriptions - which are firmly located within positivist traditions - work to make the present more real, but ethnographic work can act in similar ways

In writing about ethnography, anthropologist Clifford Geertz (1973) asked readers to think about the difference between a wink and a twitch as a way of understanding culture, the "thick description" of which Geertz argued is the central work of ethnographic anthropology He wrote:

> The thing to ask about a burlesqued wink or a mock sheep raid is not what their ontological status is It is the same as that of rocks on the one hand and dreams on the other - they are things of this world The thing to ask is what their import is: what is this, ridicule or challenge, irony or anger, snobbery or pride (p 10)

With tools like fieldnotes, coding and analysis, ethnography is good at closely describing human interactions and making connections between these interactions These descriptions make convincing arguments about, for example, whether an observed muscle spasm is a wink that indicates insider status or an involuntary reflex As a result, ethnographies do a good job of exploring questions about the meaning of people's social interactions For instance, ethnographers in mathematics education have done equity-oriented work by challenging cultural deficit theories, by articulating ways that race and gender have been made meaningful in our schools and society, and by describing culture (and children's participation in mathematics) as continually shifting and negotiated, rather than as stagnant and monolithic

However, there are other kinds of equity work to be done Genealogy, a research tradition that comes out of the work of Foucault, works on problems of equity in different ways than ethnographic studies Rather than describing social practices as they are, genealogists seek to make current practices less real. Theorist McWilliam (2003) wrote that one of the greatest challenges of adopting a genealogical perspective is letting go of the role of advocate. As an example, she noted that deciding to ask the genealogical questions "Why bullying now?" and "How bullying now?" rather than the ethnographic questions "What is bullying?" and "How do we stop it?" can be unsettling (p. 60). In similar ways, the genealogical questions of "When did we come to believe that we could summarize mathematical performance with numbers?" or "Why has it become common to explain students' schooling experiences in terms of race?" might seem like less compelling ways of working toward an equity agenda than the ethnographic questions that framed the studies described above

Genealogical studies do their equity work through thick description However, the object of description is not only human interactions in a particular time and place, but also

discourse in many times and places. The object of this work (unlike ethnographic studies) is not to document the present through the mobilization of evidence, method, and theory, but to bracket the present through argument so that the object of study appears contingent, permeable, and historically dependent. Like Geertz, the genealogist does not seek to determine the ontological status of the wink; however, she also does not want to only describe how it functions in its cultural context. Rather, her goal might be to trace the use of winking as communication to show how it became possible in a certain moment for one person to express "ridicule or challenge, anger or irony" through the twitch of the eye. By revealing the historical contingency of winking, it becomes possible to imagine a world without winking. This is how genealogy does its equity work. Rather than reinscribing the importance of current social categories, it makes it possible, however briefly, to imagine the world otherwise.

Walkerdine (1988) has written in this tradition to call into question the notion of developmentally appropriate instruction. Walkerdine described how popular theories of child development, which describe children's growth as a series of stages closely related to biological development (*e.g.*, Bredekamp & Copple, 1997), construct the subject of the child as someone who must be "developmentally ready" to engage in particular mathematical practices, such as learning place value. Rather than challenge the notion of developmentally appropriate instruction by using empirical examples to show that proposed timelines and stages were incorrect for some or all groups of children, Walkerdine (p. 204) instead used a genealogical approach to reveal ways that developmental discourses operated through particular educational practices to produce various kinds of children: "fast and slow, rote-learning and displaying real understanding, and so forth." In doing this analysis, Walkerdine made it possible for readers to question the reality of "developmental readiness," which impacts which students one sees as worthy of instruction. This kind of equity work – which makes current structures contingent – could be effectively mobilized around the achievement gap and other equity issues.

It is beyond the scope of this article to trace the lifespan of the achievement gap in the United States; however, to illustrate some of the possibilities genealogy offers to those interested in equity, I want to examine some of the factors that made it possible for us to talk about the achievement gap today. Much of the equity work in the early 1960s in the United States focused on the conditions in which African Americans lived and attended school. For example, Besse (1962) discussed discriminatory employment practices, segregation, educational opportunities, and differences between schooling experiences in the south and north. A number of other studies and critiques dealt with similar concerns (*e.g.*, Baron, 1965). Although these concerns remained the subject of academic articles throughout the 1960s and 1970s, equity discourse changed following the first large-scale U.S. study (Coleman *et al.*, 1966) to compare educational resources and academic achievement between whites and minority groups. The *Equality of Educational Opportunity* study, now often referred to as the Coleman Report, had been requested by U.S. Congress as part of the Civil Rights Act of 1964. Coleman and his colleagues surveyed thousands of U.S. schools, quantifying (among other factors) student achievement, student aptitude, school funding, numbers of books in the libraries, and education of teachers. The authors concluded that minority students' achievement was less than that of their white counterparts and that they were more affected by the quality of the schools they attended.

Although the findings and the methodologies of the report were criticized, the generation of achievement test data that could be used to compare the performance of different ethnic groups changed the kinds of conversations that it was possible to have. Researchers' attention shifted to emphasize student performance. As Kent (1968, p. 242) wrote in describing the report, "a totally different definition of equality of opportunity has been forged. This new concept embraces the effects or results of school learning rather than spurious measures of resource input." Testing for the National Assessment of Educational Progress began shortly after the publication of the Coleman Report, and, along with the regular supply of statistical data about the relative performance of student groups, came discussions about the achievement gap. The phrase was nearly absent from U.S. educational literature before the 1980s, but as data from large-scale achievement tests increased so did the number of books and articles that used the phrase in their titles. As achievement testing has increased in quantity and prominence, so has the focus on the achievement gap. The phrase has become so common that it is now used in not just articles about the gap itself but also as a warrant by authors to call for a number of educational practices, such as using literacy specialists in mathematics classes (DiGisi & Fleming, 2005) and instructing students in Piagetian concepts (Cooper & Schleser, 2006).

This small genealogical exploration of the origins of the achievement gap demonstrated the ways that a dense commonly accepted practice – measuring the achievement gap – emerged as a result of a particular historical moment. The historical tracing opens up other possibilities for thinking about equity work in education. Further studies in this tradition could deepen this argument by more closely examining the ways in which the achievement gap has been called on and defined over time as well as by examining the origins and development of other dominant practices. For example, genealogical questions could be asked about the kinds of mathematics that gets assessed by tests or about the ways we design curricula. Each of these explorations has the potential to help us imagine new ways of supporting and valuing the mathematical competence of diverse children.

Closing the gap

Overall, the goal of this essay was to challenge the assumption that calling on the achievement gap is necessary to doing equity work in mathematics. To do this, I have described the measuring and reporting of the achievement gap as a way of exercising power that emphasizes the hierarchies that it is called on to disrupt, and I have discussed two possible alternatives for framing equity work: writing under erasure and genealogy. The move, which began with the Coleman Report, to frame equity in terms of student achievement has a number of consequences, but I will

emphasize just one here. The phrase *achievement gap* highlights some aspects of equality, but not others. Focusing on achievement highlights the performance of individual students, and, because of the way it has been used in the United States, particular kinds of students - typically those who are poor and have dark skin. As Kent pointed out in 1968, it shifts the emphasis away from resources and opportunities and toward performance. Closing the achievement gap implies that our work ought to be on students (or possibly schools and teachers) who do not measure up. It does not implicate definitions of mathematics, economic inequity, cultural or language hegemony, or other practices that many of us on the desired side of the "gap" benefit from daily. By its quiet and constant reiteration, the achievement gap keeps our attention elsewhere. My hope is that, rather than solely searching for ways to manage the achievement gap, mathematics educators can begin to imagine - and work toward - a world where this particular Doomsday device has no meaning.

References

Aronson, J., Lustina, M. J., Good, C., Keough, K., Steele, C. M., & Brown, J. (1999) 'When white men can't do math: necessary and sufficient factors in stereotype threat', in *Journal of Experimental Social Psychology* **35**, 29-46.

Baron, H. (1965) 'Northern segregation as a system: the Chicago schools', in *Equity & Excellence* **3**(6), 54-59.

Besse, R. M. (1962) 'Line around the world', *Phi Delta Kappan* **43**(7), 270-275.

Braun, H., Jenkins, F. and Grigg, W. (2006) *Comparing private schools and public schools using hierarchical linear modeling* (NCES 2006-461), Washington, DC, U.S. Department of Education, National Center for Education Statistics, Institute of Education Sciences, U.S. Government Printing Office.

Bredekamp, S. and Copple, C. (eds.) (1997) *Developmentally appropriate practice in early childhood education (revised edition)*. Washington, DC, National Association for the Education of Young Children.

Campbell, D. T. and Stanley, J. C. (1963) *Experimental and quasi-experimental designs for research*. Chicago, IL, Rand McNally.

Coleman, J. S., Campbell, E. Q., Hobson, C. J., McPartland, J., Mood, A. M., Weinfeld, F. D. and York, R.L. (1966) *Equality of educational opportunity* (ED012275), Washington, DC, National Center for Educational Statistics, U.S. Government Printing Office. Available at: www.eric.ed.gov.

Cooper, J. A. and Schleser, R. (2006) 'Closing the achievement gap: examining the role of cognitive developmental level in academic achievement', in *Early Childhood Education Journal* **33**(5), 301-306.

Derrida, J. (1976) 'Writing before the letter', in *Of grammatology*. Delhi, India, Motilal Banarsidass.

Derrida, J. (1978) 'Structure, sign and play', in *Writing and difference*. Chicago, IL, University of Chicago Press, pp. 278-293.

DiGisi, L. L. and Fleming, D. (2005) 'Literacy specialists in math class! Closing the achievement gap on state math assessments', in *Voices from the Middle* **13**(1), 48-52.

Foucault, M. (1980) *Power/knowledge: selected interviews and other writings 1972-1977*. New York, NY, Pantheon.

Foucault, M. (1978) *The history of sexuality: an introduction*. New York, NY, Random House.

Geertz, C. (1973) 'Thick description: toward an interpretive theory of culture', in *The interpretation of cultures: selected essays*. New York, NY, Basic Books, pp. 3-32.

Gutiérrez, R. (2007) '(Re)defining equity: the importance of a critical perspective', in Nasir, N. S. and Cobb, P. (eds.), *Improving access to mathematics: diversity and equity in the classroom*. New York, NY, Teachers College Press, pp. 37-50.

Kent, J. K. (1968) 'The Coleman report: opening Pandora's box', in *Phi Delta Kappan* **48**(5), 242-244.

Kubrick, S. (1964) *Dr. Strangelove or: how I Learned to stop worrying and love the bomb* (movie), Sony Pictures.

Lather, P. and Smithies, C. (1997) *Troubling the angels: women living with HIV/AIDS*. Boulder, CO, Westview Press.

LeCompte, M. D. (1995) 'Some notes on power, agenda, and voice: a researcher's personal evolution toward critical collaborative research', in McLaren, P. and Giarelli, J. (eds.), *Critical theory and educational research*. Albany, NY, State University of New York Press, pp. 92-112.

McWilliam, E. (2003) 'Writing up writing down: authenticity and irony in educational research', in Tamboukou, M. (ed.), *Dangerous encounters: genealogy & ethnography*. New York, NY, Peter Lang, pp. 57-68.

National Council of Teachers of Mathematics (2005) 'Closing the achievement gap: a position of the National Council of Teachers of Mathematics', in *NCTM News Bulletin*, August 4.

National Council of Teachers of Mathematics (2000) *Principles and standards for school mathematics*. Reston, VA, NCTM.

National Research Council (2005) *Adding it up: helping children learn mathematics*. Washington, DC, National Academy Press.

Snyder, T. D. (2008) *Mini-digest of education statistics 2007* (NCES 2008-023), Washington, DC, National Center for Education Statistics, Institute of Educational Sciences, U.S. Department of Education.

United States Department of Education (2007) *Institute of Education Sciences, National Center for Education Statistics, National Assessment of Educational Progress (NAEP), various years, 1992-2007 Mathematics Assessments*. Available at: http://nationsreportcard.gov/math_2007.

Walkerdine, V. (1988) *The mastery of reason: cognitive development and the production of rationality*. London, UK, Routledge.

Walshaw, M. (2001) 'A foucaldian gaze on gender research: what do you do when confronted with the tunnel at the end of the light?', *Journal for Research in Mathematics Education* **32**, 471-493.

How many pairs?

Find all pairs of whole numbers (m, n) such that

$$3 \times 2^m + 1 = n^2$$

and explain why there are no more.

(posed by Alistair Lachlan; selected by Malgorzata Dubiel)