

Beyond Math Content and Process: Proposals for Underlying Aspects of Social Justice Education

Marilyn Frankenstein

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For at least the last 30 years, the start of my public university's new academic year has been accompanied by some announcement from our Chancellor that we are in a fiscal crisis and must make budget cuts. And for at least the last 30 years, like an (outraged) automaton, I get up and say something like: "We do not have a fiscal crisis, we have a social justice crisis, where the rich do not pay their fair share, where the rich do not contribute adequately to provide for a vibrant public sector. We need to get back what the rich have stolen from our common wealth." For the last few years, I have been thinking about what I might contribute to change this situation, and have decided that community education about tax policy will now become the focus of my professional work.

At this point in my professional life, I believe I have made my contributions to *criticalmathematics* education. When Arthur Powell and John Volmink and I formed the Criticalmathematics Educators Group (CmEG) in 1991, following a conference we organized in October 1990, we decided to use one word to describe critical mathematics education because of our hope that one day all mathematics education will be critical. For at least the last 30 years, I have been developing a theoretically based practice in criticalmathematics literacy education. To my knowledge, limited to English language publications, I coined the term "critical mathematics education" in Frankenstein (1983a). However, simultaneously, in Denmark, Ole Skovsmose was developing a project-based practice for his doctoral work, underpinned by critical theory, which he also referred to as critical mathematics education. He completed his thesis in 1982; his ideas were later published in English, starting with Skovsmose (1985 and 1994). Rico Gutstein (2003) developed a critical mathematics curriculum for high school students in Chicago, and explicated it further based on his teacher-research in Gutstein (2006). Now, I am hoping others will develop critical mathematics curricula in other areas, such as calculus and inferential statistics.

To document my more than 30-year contribution to criticalmathematics education, I intend to publish a collection of my articles and curricular materials, including my early criticalmathematics literacy ideas (Frankenstein, 1981), as well as other writings on

mathematics education (e.g., Frankenstein, 1984) and other writings on education (e.g., Frankenstein, 1983b). This collection will also include relevant political and professional memories and visual autobiographical collage; and, it will provide an introduction to the new direction of my work. At this point, I have not done anything but the title—*Go Figure: A Half-life Teaching Math for Social Justice*—which is a multiple word-play. “Go Figure” obviously refers to my criticalmathematics literacy work where I urge people to go use basic calculations with numbers to strengthen their work for social justice; but it is also an expression (which must be heard with the proper Brooklyn-Jewish inflection) meaning, in my case, “Go figure, who would have thought she’d end up a college professor, let alone a *full* professor?” “Half-life” is first an in-joke, given that at 63, my work is probably more than half over, but because I am often late, I can even be late for my “half-life.” But, more seriously, “half-life” refers to a measure of radioactive decay that many people do not understand, and my work is about the political need to understand such measures in order to act in an informed way about issues such as, in this case, nuclear power. Finally, because this measure means the main radioactive elements used in nuclear power will be around, in essence, forever, my title refers to a (braggy) hope that the contributions I have made to mathematics education will also be around a really long time.¹

Currently, my interdisciplinary work involves understanding political and social arguments through media literacy, economic literacy, as well as criticalmathematics literacy (see Frankenstein, 2007, 2010, in press). Also, I am planning the long-term community project on tax policy education mentioned above, moving from teaching university students in an activist academic environment to teaching people in communities, in the streets, with the goal of education for activist participation in social justice. As this project moves forward, I will, of course, not only use what I learned from my criticalmathematics literacy work—including specific content and process ideas about teaching and learning basic mathematics concepts—but also include ideas, learned through reflecting on my teaching experiences, that I believe underlie any education for social justice.

I also expect to learn something about how people could become educated and engaged community members and, thereby, create a vibrant democracy. Because this community education will be a completely voluntary learning environment that involves a deep, interdisciplinary course of study, it should provide an opportunity to see how people develop motivation to learn. Since there is no reward of a degree, or of a job, how and why will people decide they want more education? Which teaching methodologies and materials will support the kind of interdisciplinary learning and knowledge creation needed to understand the meaning of the “academic” topic of tax policies to individuals’ lives and to the lives of the various communities to which they belong? And, how do people incorporate their learning into their lives? How do people translate their knowledge into actions, and how do their actions influence their continuing education? How does our democracy change as people become more active in decision-making about public and community issues?

Because for me, the overarching purpose of all education is to contribute to the struggle for a more just world, the purpose of this community education project is to inspire informed action for a more just distribution of our common wealth through changes in tax policies. But, I

also think this community education project has the potential to expand our ideas about the role of public universities to include educating *all* the public, not just the people who are current students. I hope this project will also spark our ideas about the possibilities of interdisciplinary and activist education. I hope this project will make a contribution towards reinvigorating the public sector, a public sector that can struggle for democracy and against our current oligarchy of the super-wealthy. I believe that academic studies should be about getting outraged (in other words, finding out what's going on) and focusing that outrage into actions/reflections that move us, peacefully, but forcefully, in the direction of more justice. With this community education project, I hope to take these ideas outside the university and into our democracy.

So, in this chapter, I am not going to write much about the specifics of mathematics education but rather about ideas that I believe should underlie all education, inside or outside particular institutions, ideas that are important in all teaching to make everyone feel included in academic and political life, and to develop a commitment to social justice. Nonetheless, whenever possible, I illustrate these general ideas with examples from my critical mathematics literacy curriculum.

Proposals for Underlying Aspects of Social Justice Education

The ideas I present in the following discussion fall into three broad categories: respecting students' knowledge, teaching (lots of) content knowledge, and reflecting on knowledge.

Respecting Students' Knowledge

Respecting students' knowledge means that we recognize the importance of intellectual diversity and challenge mainstream ideas about who *are* the intellectuals; we also need to challenge what most people "take-for-granted," thereby expanding students' interests and imaginations. To create a just society everyone needs to realize that their intellectual activity counts; and, to feel able to evaluate nonsense proposed by so-called "leading" intellectuals. People become motivated to participate in their society and to keep learning when their ideas are respected. Much about respecting people's intellectual activity and motivating them to participate in their society can be learned from the experiences and philosophy of the Brazilian Movimento dos Trabalhadores Rurais Sem Terra (MST, Landless Rural Worker's Movement, <http://www.mstbrazil.org/>). The first time I visited an encampment, over 100 people, of all ages, came to ask me questions. They were living in very rudimentary shelters, as they were occupying the land and in the midst of a struggle to gain ownership. My friend and colleague, Brazilian Professor Gelsa Knijnik, whose political and intellectual work is with the MST, told me that most could not read or write. The first question a young man asked me was why is the United States blockading Cuba? Then a middle-aged person asked me a technical question about Monsanto's genetically engineered seeds. These people are "illiterate" in terms of reading and writing, but they have not been de-educated, and they have access to information and ideas through radio stations that present international news from the perspective of those

outside the circles of power. Joao Pedro Stedile, a member of the MST's national board, reflects that

We've won back the worth and dignity of the peasant. That has immeasurable value. It doesn't show up in statistics. But when a person stops being humiliated, stops being a slave, and they can walk with their head up, master of their own future, that's the most important thing we're building. (as cited in Peters & Podur, 2002) Further, Stedile states that people's participation in budget decisions for their community

creates an opportunity for the people to voice their opinions. For the people to have a say about the overall problems of their society. It's like an exercise that points toward creating a general assembly of the society as a whole. Here in Rio Grande do Sul, we have a population of 12 million. You can't fit 12 million people into a single room. But the idea of the participatory budget process is that everyone can take part and have a say. So the main value of the process is not how much of the budget people have a say over, but as a democratic exercise that teaches people that they have a right to a say. (as cited Peters & Podur, 2002)

In the context of basic critical mathematics literacy, valuing intellectual diversity means that we should re-think the concepts of "remedial education," "underprepared student," and the like. In my critical mathematics literacy curriculum, I attempt to inspire students to think about intellectual diversity using an illustration from the work of Ascher and Ascher (1997) where they present a widely disseminated anecdote about a trade between an African shepherd and an explorer. The herder agrees to accept two sticks of tobacco for one sheep but becomes confused and upset when given four sticks of tobacco for two sheep. The story was originally told with the racist sub-text suggesting that the African herder could not comprehend $2 + 2 = 4$. An alternative interpretation, however, which respects the herder's knowledge, "raises the issue of the difference between a mathematical concept and its application" (1997, p. 29), given that sheep are not standardized units. Therefore, it is logical that a second, different sheep would not also be worth two sticks of tobacco, illustrating that "the applicability of even the simplest of mathematical models becomes a question of cultural categorization" (1997, p. 29). When I have used this example in class, students also speculate that a contract for the first sheep must be renegotiated when the initial terms change (i.e., a second sheep is added to the deal). When students reflect on this example, they begin to develop respect for their own logic, and a respectful attitude of interest to learn from others about how they think and why they give the answers they do.

Further, I conclude this lesson with an interdisciplinary discussion of some relevant history of statistics. Zaslavsky (1973) relates that Sir Frances Galton first told this tale after he visited Africa. Galton, who coined the term "eugenics" in 1883, considered measurement "the primary criterion of a scientific study" (Gould, 1981, p. 75). In essence, he tried to "standardize" anything that might possibly be measured, including prayer, beauty, and boredom—the latter by "counting the number of [a person's] fidgets" (F. Galton, as cited in Gould, 1981, p. 75). He further believed that nearly everything he could measure was inheritable. When his cousin Charles Darwin pointed out that "men did not differ much in intellect, only in zeal and hard

work,” Galton countered that “the aptitude for work is heritable like every other faculty” (F. Galton, as cited in Gould, 1981, p. 77). Therefore, it is not surprising that Galton could not see a more sophisticated reason for the shepherd’s confusion. Moreover, an important note for the politics of knowledge is that Galton was considered a leading intellect of his time and his “scholarship” had significant influence on the development of modern statistics (Gould, 1981).

Finally, when people respect each other’s intellectual activity, many taken-for-granted ways of our own thinking and knowing are challenged, thereby expanding students’ (and teachers’) interests and imaginations. I believe that we have an ethical responsibility to “force” our students to grapple with a progressive analysis of what is going on in our world. Of course, I do not mean that they have to adopt these positions, but too often I read student papers that repeat the mythologies of “imperial America,” even from students who I know would disagree if pushed to deeply reconsider what they are saying. I believe that we are disrespecting people (including our students) if we do not challenge ideas they have when we disagree. Freire (1982) is insistent that his concept of dialogical education does not mean teachers are merely a “passive, accidental presence”:

The opposite of manipulation is not an illusory neutrality, neither is it an illusory spontaneity. The opposite of being directive is not being non-directive—that is likewise an illusion. The opposite both of manipulation and spontaneity is critical and democratic participation by the learners in the act of knowing, of which they are the subjects. (Freire, 1981, p. 28)

In my critical mathematics literacy curriculum, we look at the taken-for-granted assumptions behind even the most “neutral” word problems, for example, totalling a grocery bill. Why do we assume that the only way a society can be organized is if people pay for food? Why don’t mainstream texts have word problems comparing grocery bills in poor neighbourhoods with those in rich neighbourhoods or mathematical investigations that could relate to issues of hunger and capitalism where tens of millions of tons of surplus food rot for the profit of a few (Mittal, 2002), while approximately 40 million people die from hunger and hunger-related illness every year and “available evidence indicates that up to 20,000,000 citizens [living in the USA] may be hungry at least some period of time each month”ⁱⁱ (National Council of Churches, 2007).

To respect student knowledge and thus work for justice, I believe it is important to explore many issues that students might not be interested in initially. Finding out that scarcity of food is not the reason so many starve to death every year—people just cannot afford to buy the food that is available—can motivate students to want to know more about poverty. To work for justice, it is important for students to imagine what another possible world would be like, to grapple with big ideas: Why can’t we eat like we breathe, without paying (except contributing to the general revenues of our government through paying taxes)?ⁱⁱⁱ

Teaching (Lots of) Content Knowledge

Teaching (lots of) content knowledge means that we teach interdisciplinary curricula, including (lots of) background knowledge, and that we teach challenging material, including a specific focus on understanding institutional racism and other structural oppressions that underlie the injustices in our society. Finally, it means we teach categories of analysis and theories of how society works. Of course, this does not mean that how we teach and learn should be ignored; this does not mean that critical reasoning and other skills and concepts should be neglected. Instead, this focuses on the importance of having lots of knowledge to be reasoning *about*, and goes beyond process challenges to “banking” education, to focus on *what* was being deposited.

One way to develop reasoning and to focus on what is reasoned about is to understand satire. Howard Zinn argues that a key part of an education for social justice is to talk about the promises that are made in documents such as *The Universal Declaration of Human Rights* and “the gap between that promise and what’s going on. And therefore suggest in varying degrees of persuasion that that gap should be filled” (as cited in Schivone, 2009, p. 53). The sophisticated reading skills and extensive background knowledge that are used in understanding satire involve realizing the gap between what is literally said and what is real. Further, as George Orwell stated: “Every joke is a tiny revolution [because...] it upsets the established order” (as cited in Woodside, 2001, p. 5). Therefore, in my critical mathematics literacy curriculum, I use several political cartoons that involve understanding various mathematics concepts in order to appreciate the satire (see Frankenstein, 2006).

The first consideration when teaching (lots of) content knowledge it that without making interdisciplinary connections in our teaching, I think it is difficult to show the interconnectedness of all our struggles for justice. In my critical mathematics literacy curriculum, the mathematics skills and concepts are learned to understand the social justice issues more deeply; the social justice issue is not used as a backdrop from which to learn the mathematics skills and concepts (Frankenstein, 2009). For example, when I ask students to discuss what numerical understandings they need to understand the political and personal implications of the chart below (Figure 1) from a General Electric time-motion study (Braverman, 1974), the students are reviewing the meaning of decimal fractions, the conversion of minutes to seconds, and general ideas about how we measure time, which leads to the politics of why this chart describes minutes measured to the nearest thousandth. But the discussion also includes what these kinds of measurements say about the conditions of work and, more theoretically, how these kinds of measures of work connect to Marx’s conception of “abstract labor.”

OPEN and CLOSE	MINUTES
Open side drawer of standard desk	0.014
Open centre drawer	0.026
Close side drawer	0.015
Close centre drawer	0.027

CHAIR ACTIVITY	MINUTES
Get up from chair	0.039
Sit down in chair	0.033
Turn in swivel chair	0.009

Figure 1. Time-motion study conducted at General Electric for the purposes of increasing employee “productivity.”

Second, when teaching (lots of) content knowledge, the material will be challenging. Therefore, early in the term, I have students read two very short papers on “The Act of Studying,” written by Paulo Freire in his literacy work with Sao Tome and Principe after these African nations won their freedom from the Portuguese (Freire & Macedo, 1987). These are excellent ways to start an appreciation of the challenges and importance of taking all studying seriously. I often find that student difficulties are the result of the material being too easy, not too hard. For example, the concept of decimal fractions in Figure 1 is not just a matter of remembering the place-values and how to read and convert them to other forms; it involves the complex understanding of how it makes no sense to describe work time in thousandths of a minute unless one wants the chart to be veneered with scientific precision and obscure from clear understanding. Teaching why one multiplies by 60 to convert these minutes to seconds requires more than an algorithm to memorize; it requires understanding that we are really finding out how many seconds are in one-thousandth of a minute (i.e., dividing 60 by 1000) and then multiplying by the number of thousandths of a minute for each work activity, and these operations are commutative in such a way that the algorithm works. Moreover, moving beyond just the numbers to what those numbers mean in the real world requires thinking deeply about what work is and who controls various aspects of work in our economy. My suggestion is that spending more time on fewer exercises can be a valuable learning experience for students with little background knowledge and/or “academic” skills.

A clear example of challenging material is found in exploring institutional racism and other structural oppressions and their interconnections. The reason I single out this specific content area is my belief that the struggle against institutional societal inequities such as racism, sexism, and economic inequality must be at the heart of creating a more just society. Although material concerning these institutional oppressions has always been a central component of my work, an initial presentation I gave concerning proposals for underlying aspects of social justice education, did not separately highlight this content area. After hearing Danny Martin’s keynote presentation at the Mathematics, Education and Society conference (MES6) in Berlin (Martin, 2010) I realized the necessity of singling out this area.

One particularly important area to explore related to racism and directly relevant to mathematics education is the mis-measurement of intelligence. Gould (1981), in his seminal work on the history of these measures shows, by recalculating findings from the original raw data, how ideology about who (racially) was intelligent influenced which samples were included in the calculations of early nineteenth-century researchers such as Samuel George Morton.

Unfortunately, this kind of inappropriate measure of intelligence is not just from the distant past. Gould (1995) demolishes the two major arguments underpinning Herrnstein and Murray's (1994) notorious *The Bell Curve*, a book whose major claim is that inherited intelligence is responsible for economic success.^{iv}

In an interdisciplinary approach to teaching, after reviewing the statistical errors in Herrnstein and Murray's work, students can study some satire about this topic. A brilliant one talks of the U.Q. (unscrupulousness quotient) effect developed from "longitudinal [genetic] studies of thousands of lives, using statistical techniques that hold constant such variables as environment, family status and measured I.Q. [which found that] life-time income correlates almost perfectly with U.Q." (Hilgart, 1994, p. 614) Of course, as with many satires, the satire contains more truth than the reality. For another example see Bernstein (1995). Also, there is a great cartoon by Barsotti (<http://www.barsotti.com/>) where two kings are walking and one says to the other: "I don't know anything about the bell curve, but I say heredity is everything."

And, very importantly, the media reaction to the completely discredited arguments about racial differences regurgitated in *The Bell Curve* is part of the picture that should be reviewed in an interdisciplinary curriculum. Naureckas (1995) recounts how in the "respectable" media, from *The MacNeil/Lehrer NewsHour* to *Charlie Rose* and the *New Republic* to the covers of *Newsweek* and the *New York Times Magazine*, racism was treated as a "respectable intellectual position" (¶ 2). An article in *Newsweek*, for example, stated: "As the shouting begins, it's worth noting that the science behind *The Bell Curve* is overwhelmingly mainstream" (G. Cowley as cited in Naureckas, 1995, ¶ 6). Omitted from focus was the major funding source of Murray and Herrnstein's (1994) "research"—the Pioneer Fund, established "in 1937 by Wickliffe Draper, a millionaire who advocated sending blacks back to Africa," and whose first president, Harry Laughlin, was "an influential advocate of sterilization for those he considered genetically unfit" (Naureckas, 1995, ¶ 9).

Finally, an interdisciplinary look at the measurement of intelligence should also include concerns about the problematic focus on the measure of the racial "achievement gap." Martin (2009) argues:

Just as race is socially constructed, I claim that achievement differences and "racial gaps" are also socially constructed and contingent. They are not real in the sense that they tell us anything factual, objective, or indisputable about African American, Latino, Native American, Asian American, or White children. What these so-called gaps do highlight are the adverse conditions under which some children are often forced to learn, the privileged conditions afforded to others, and how forces like racism are used to position students in a racial hierarchy. (p. 6)

Further, Gutiérrez (2008) discusses the dangers of focusing research on the racial achievement gap, arguing that such research offers "little more than a static picture of inequities, supporting deficit thinking and negative narratives about students of color and working-class students, perpetuating the myth that the problem (and therefore solution) is a technical one, and

promoting a narrow definition of learning and equity” (p. 357). Instead, she urges researchers to focus on “advancement (excellence and gains) and interventions for specific groups” (p. 357).

In order to make sense of (lots of) content knowledge, and in order to develop plans to work for social justice, I believe it is necessary to teach categories of analysis^v and theories of how society works. Many people, including those who are active in their communities, working for justice, are not aware that underlying theories that explain particular events are useful to social justice activists. Marcuse (1964) argues for the importance of developing an overarching theory of society, which individual events illuminate, or challenge, and which unclouds the organizing structures of society and clarifies that people control those structures:

The trouble is that the statistics, measurements, and field studies of empirical society and political...science are not rational enough. They become mystifying to the extent to which they are isolated from the truly concrete context which makes the facts and determines their functions. This context is larger and older than that of the plants and shops investigated, of the towns and cities studied, of the areas and groups whose public opinion is polled or whose chance of survival is calculated....This real context in which the particular subjects obtain their real significance is definable only within a theory of society. (p.190)

Nteta (1987) argues for the activist effects of the development of theory. He states “revolutionary self-consciousness [is] an objective force within the process of liberation” (p.55) Nteta shows how the aim of Steve Biko’s theories, and of the Black Consciousness Movement in South Africa, was “to demystify power relations so that blacks would come to view their status as neither natural, inevitable nor part of the eternal social order...[creating] conditions that have irreversibly transfigured South Africa’s political landscape” (pp. 60–61).

Reflecting on Knowledge

Reflecting on knowledge means that we understand the non-neutrality of all knowledge, and the connections between knowledge and power. Knowledge is not neutral. In my writing about teaching adults criticalmathematics literacy, I have argued—strongly—that knowledge does not exist apart from how and why it is used, and in whose interest. Gill (1988) gives a mathematical example, citing texts that “neutrally” define “profit” as the difference between the selling price and the cost price. In contrast, she argues that a Marxist definition of profit as ultimately unpaid labour “suggests that if the total of goods or capital in a social system is unequally divided between people at different levels in the social-industrial hierarchy, exploitation is necessarily taking place” (p. 122)

There are myriad such examples from any field. Another that can be used very effectively is the contrast between the commonly believed and the actual story of Rosa Parks, and why she refused to give up her seat on the segregated bus, an act that sparked the Montgomery Bus Boycott. Was she just a tired seamstress, or an activist with a plan to fight for justice? Kohl (2005) critiques the “taken-for-granted” story, point by point, using Parks’s and Martin Luther King’s and other activist’s and scholar’s testimonies and research:

When the story of the Montgomery bus boycott is told merely as a tale of a single heroic person, it leaves children hanging or searching for someone to follow, when *they* should be the actors....the idea that only special people can create change is useful if you want to prevent mass movements and keep change from happening.... As a tale of a social movement and a community effort to overthrow injustice, the [real] Rosa Parks story...creates the possibility of every child identifying her- or himself as an activist, as someone who can help make justice happen. (p. 57)

Other resources that challenge the “neutrality” of knowledge include a terrific political cartoon by Joel Pett (<http://www.newseum.org/pett/>) titled: “Environmental education—the balanced view,” which depicts a teacher telling some students: “Of course, deforestation, overpopulation, habitat loss, species extinction, global warming, erosion, overfishing, pollution, sprawl, and war could be good things!” Pett says: “One of the attributes of writing satire is that you develop a strong sense of how unfair this world is.” (<http://www.newseum.org/pett/about.htm>, paragraph 4) And then there is Stephen Colbert’s terrific satirical riff on “The Neutral Man’s Burden” (<http://www.colbertnation.com/the-colbert-report-videos/238783/july-16-2009/the-word---neutral-man-s-burden>).

In the context of schools, Profreidt (1980) contends that in most educational settings there exists

a silly neutralism in which teachers believe they are just presenting facts and avoiding opinions or value statements. They avoid value statements because...they do not believe that such statements are susceptible to rational inquiry and verification. Of course, in practice they are transmitting a set of values, but one which is not identified as such, and hence is not open to critical inquiry. (p. 477)

Reflecting on the non-neutrality of knowledge opens up exploring the connections between knowledge and power. In a critical mathematics curricula, looking at the hidden history of various people’s contributions to the development of mathematics and how these contributions were (dis)counted is an example of the connections between knowledge and power. In particular, Diop (1991) provides insight into how racism is intertwined with what counts as intellectual activity. He discusses a number of cases in which European scholars denied the sophisticated mathematical knowledge of the ancient Egyptians. One such example concerns the insistence that the ancient Egyptians had not developed a formula for the surface of a sphere ($s = 4\pi r^2$ demonstrated in problem 10 of the Papyrus of Moscow).

Furthermore, Diop (1991) points out that even Richard Gillings, who argued forcefully for the sophisticated mathematical knowledge of the ancient Egyptians, gets caught up in the practical–theoretical dichotomy. After accepting the interpretation of problem 10 as the formula for the curved surface of a hemisphere, 1500 years ahead of Archimedes’ work, Gillings (1972) speculates:

Whether the scribe stumbled upon a lucky close approximation or whether their methods were the results of considered estimations over centuries of practical applications, we cannot of course tell....[From murals and other art, one can conclude that] the art of the basket maker or weaver must have been one of some consequence in the Egyptian economic world. When one is weaving baskets which are roughly hemispherical one requires a quantity of material for the circular plane lid that is about half that required for the basket itself. Since the calculation of the area of a circle was a common place operation to the scribes (problem 50 of the Rhind Mathematical Papyrus), over a period of years it could have come to be equally commonplace that the curved area of the hemispherical basket was double that of the circular lid. (pp. 200–201)

Diop, however, provides a counter argument, commenting on how absurd it is to think that solely empirical observation, without any theoretical reasoning, could lead to such complex mathematical knowledge. Diop further remarks on how curious it is that

if the ancient Egyptians were merely vulgar empiricists who were establishing the properties of figures only through measuring, if the Greeks were the founders of rigorous mathematical demonstration, from Thales onwards, by the systemization of ‘empirical formulas’ from the Egyptians they would not have failed to boast about such an accomplishment. (p. 255)

Surely, this discussion of the mathematical knowledge of the ancient Egyptians provides an example of Freire and Macedo’s (1987) contention that “the intellectual activity of those without power is always labeled non-intellectual” (p.122).

Concluding Thoughts

How can the continuing injustices, and the connections among those injustices to deeply entrenched institutional structures such as the “free market,” be deeply understood without discouraging people? The context of many peoples’ lives is such that they have been involved in struggles for social justice. And different groups of us have experienced some victories. However, given the resources to regroup of those currently in power in much of the world, we wind up fighting the same battles over and over, and too often, initial victories are overturned or co-opted. Nevertheless, those of us who are committed to the struggle for a just world keep fighting. So how can we encourage our students to join in for the long haul?

When we deeply understand that not everyone goes along, when we study some of the many ways people have and are continuing to resist the exploitative actions of those in power, we can realize that our efforts to resist injustice and create more justice in the world matter. Zinn (2004) cites specific examples of how history has many surprises, some of them victories for justice:

It's clear that the struggle for justice should never be abandoned because of the apparent overwhelming power of those who have the guns and the money and who seem invincible in their determination to hold on to it. That apparent power has, again and again, proved vulnerable to human qualities less measurable than bombs and dollars: moral fervor, determination, unity, organization, sacrifice, wit, ingenuity, courage, patience—whether by blacks in Alabama and South Africa, peasants in El Salvador, Nicaragua and Vietnam, or workers and intellectuals in Poland, Hungary and the Soviet Union ... The future is an infinite succession of presents, and to live now as we think human beings should live, in defiance of all that is bad around us, is itself a marvelous victory.^{vi}

Even more than the facts, experiences working for social change with groups that challenge our silence, that challenge our helplessness in the face of huge problems, that motivate intervention and resistance, can be the foundation for commitment. Neuro-linguist George Lakoff (2009) insists that just telling people the facts, facts about policies that will make their lives better, does not mean that they will support the policy. This lack of support is not because they are “stupid,” but, rather, because research in cognition and neuroscience shows that people do not reason through “pure” logic alone, but also through their emotions, their sense of empathy, and their ethics.

Working for even small changes for justice is never easy. I believe it is important for students to start with some awareness of what they will come up against when they are out in the world working for justice; and, for students to work with people who will reflect on their experiences, work on creative new approaches using their reflections, and persist. Lorde (1988), writing about her battle against cancer, defines hope as: “a living state that propels us, open-eyed and fearful, into all the battles of our lives. And some of those battles we do not win. But some of them we do” (p. 80).

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Endnotes

ⁱ Communications with my friend Miriam Pope assisted me in sharpening this title; more contributions are welcome.

ⁱⁱ Related to the politics of language, *The Progressive* (2007, p.11) cites a Washington Post article indicating that the United States Department of Agriculture will no longer use the word “hunger” to describe people who cannot get enough food to eat; instead these people will be described in official government documents as having “very low food security.”

ⁱⁱⁱ A wonderful non-mathematical example of expanding students’ imaginations is recounted in Edward Said’s (1999) memoir when, as a young student, he was given an assignment to write about the topic of lighting a match.

^{iv} See Frankenstein (in press) for some examples of the mis-use of statistics in *The Bell Curve*.

^v A terrific political cartoon by Tom Ferguson (<http://www.thinkspeak.net/>) an Atlanta painter, political cartoonist and songwriter, shows an airplane nose-diving into a mountain range with three speech bubbles: “Conservative: No government meddling; the free market is self-correcting;” “Liberal: Oh, perhaps, a bit, but gradually;” “Radical: We need to change direction, now!”

^{vi} An excellent film about one of these struggles is Stanley Nelson’s *Freedom Riders* <http://www.pbs.org/wgbh/americanexperience/freedomriders/>