tweets, though records of what he tweeted are available in news archives, such as at www.theguardian.com/music/2016/jan/25/bob-rapper-flat-earth-twitter

[2] Examples of such stories may be found at: www.cnn.com/2016/01/26/entertainment/rapper-bob-earth-flat-theory/ and www.washingtonpost.com/news/answer-sheet/wp/2016/02/02/why-in-the-world-would-rapper-b-o-b-think-the-earth-is-flat-a-quick-science-lesson/

[3] Tyson was called in for a "science emergency" on Larry Wilmore's *The Nightly Show* (youtu.be/XHBZkek8OSU)

[4] An example of one such tweet may be found at twitter.com/bobatl/status/691411463051804676

Ableism and the ideology of merit

ROSSI D'SOUZA

In a communication in FLM36(1), I discussed a teaching episode in which my students in a school for the blind explored properties of odd and even numbers and developed novel definitions (D'Souza, 2016). In that session, despite trying to get the students to construct their own mathematical ideas, I kept trying to lead them to arrive at the standard mathematical definition. However, I was uneasy with this approach, because, as Mukhopadhyay and Roth (2012) have pointed out:

> Even though constructivist theory emphasizes the personal construction of knowledge, actual mathematics education practices generally aim at making students construct the "right", that is, the canonical practices of mathematics—not realizing that for many, this may mean symbolic violence to the forms of mathematical knowledge they are familiar with, and that the standard processes typical of mathematics education contribute to the reproduction of social inequities. (p. vii)

Some days later, I planned to quickly revise the topic of odd and even numbers and move on to another topic. However, we ended up again debating the evenness of zero. The students now insisted that zero is a special number that should not be placed in the broad category of even numbers. Their final winning argument was that if we keep dividing even numbers like 2, 4, 6, 8, … by 2, we finally reach an odd number. However, this does not happen with zero. They were right. Now that they had constructed valid, yet "not right" mathematics, my former uneasiness vanished. But it was replaced by another problem.

On narrating this incident, some of my colleagues were uncomfortable at the thought of "poor blind children" having the "wrong" concept. "What if they give such answers in their exams?" and "You finally told them the correct definitions, right?" were standard responses. I "needed" to tell my students the "correct" definition of even and odd numbers, albeit with a disclaimer about the nature of formal curricular mathematics, lest they raise questions or present alternative mathematical opinions in future mathematics exams, and fail.

Ideology of merit

I argue that ideology, and specifically what I term as the ideology of merit, played a significant role in my addressing my students and even the reactions from colleagues. Borba and Skovsmose (1997) describe ideology as "a system of beliefs which tend to hide, or disguise, or filter a range of questions connected to a problematic situation for social groups [...] obstructing possibilities for identifying and discussing the nature of the 'crisis'" (p. 17). Discussing mathematical ideologies, Richard Noss (1994) writes of the "overwhelming temptation to view the subject matter as given, inevitable, *natural*" and the "tendency for ideologies to become 'common sense', applied without explicit intention and [...] an accompanying tendency to see the surface reality of this as their unalterable bases and causes" (p. 2). I employ these descriptions to present the notion of the ideology of merit, by which I mean the underlying (conscious or unconscious, explicit or implicit) worldview in which "merit" or "excellence" is taken to be the main driving force for learning a body of knowledge. And, in mathematics education in India, "excellence" too often refers to how well a student can follow prescribed (or other) procedures to solve *given* problems in order to get the one given correct answer to each problem, thus limiting the opportunity for students to investigate answers or ask their own questions. Our investigation of odd and even numbers was restricted through this ideology of merit.

One of my students once raised the question, "If mathematics is all in the head then why is there an emphasis on the paper and pencil?" On another occasion when I asked my students what was their most difficult topic in mathematics, they replied, "Steps". They could solve mathematical problems, but had to show all the in-between steps on paper, lest they be deemed less meritorious.

We often do not know what our ideologies are; they can only be revealed by examining our actions. For example, if we profess to have an ideology of peace and non-violence, but go to school and regularly beat our students if they misbehave, then our actual ideology is not non-violence. Similarly, we may profess an ideology of believing in the importance of an inquiry method of teaching, but then not allow students to ask questions—especially systemic questions. By analysing our actions, we can try to understand our ideologies and also work towards changing them. When our ideology is consistent with the ruling or dominant ideology, we tend not to realize that we have it. By opposing the ideology of merit in this communication, I advocate trying to adopt an anti-merit ideology.

Merit is interdependent with what Teltumbde (2008) refers to as hyper-individualism, of which he says:

> It atomizes society into discrete individuals, each against the rest of them [...] It legitimize[s] the right of (the) strong to exploit the weak [...] It establishes the inevitability of the "underclass" of those who cannot participate in competition, which should survive only as subservient to those who are competitive [...] Neoliberalism believes that the world should be [an] enjoyable place for those who deserve it and should be rid of those who do not. (p. 22)

By categorizing the victims, merit rationalizes the exploitation of oppressed castes [1] and disabled people. It tells them that they too can enjoy the privileges of winning the competition by working harder (or doing whatever they are "differently abled" at). But how can you have winners without having losers? If one's "achievement" is defined in relation to others, it can only be at the expense of somebody's failure. Irrespective of how hard people work, merit ensures that most people are losers. And further, the criteria for winning are decided by the dominant, privileged groups. It is not coincidental that most losers are from oppressed groups. And they may be told that if they had just worked harder they would have succeeded like the deaf-blind Helen Keller or the Dalit, Eklavya.

Ableism, caste and "content"

An ideology of merit also reinforces Ableism, which Campbell (2001) defines as:

> A network of beliefs, processes and practices that produces a particular kind of self and body (the corporeal standard) that is projected as the perfect, species-typical and therefore essential and fully human. Disability then is cast as a diminished state of being human. (p. 44)

Ableism is often spoken of as being synonymous with the oppression of disability—the discrimination faced by people with disabilities. The concept of Ableism is similar to the idea of deficiencialism coined by Marcone (2015), which he refers to as "normal people defining abnormal people" (p. 132). I would argue that designing a mathematics curriculum that presumes that students can see, and learn better if content is taught in a visual manner, is an instance of Ableism.

But there's more to Ableism that such discourses do not sufficiently convey. Although "deficiencialism" aptly connotes having less (than "normal"), it says little about what "having more" could entail. The concept, "Gifted" carries this connotation of "having more", but is unfortunately celebrated as an individual feat, even though giftedness (being blessed with more) can exist only in relation to deficiency (being cursed with less). So if we speak of giftedness as being inherent (not a socially constructed problem), we imply that so is deficiency.

In relation to caste, Somwanshi [2] has argued that "caste is a structure that includes 'everyone' […] oppression can't exist without someone getting undue privilege". In a similar sense, Ableism includes everyone, not just disabled people. Ableism is not just the oppression of disability, it is also privilege.

For example, Skovsmose (2016) discusses how "difficulties arise from the relationship between Braille and mathematical symbols" (p. 3). We should relate these difficulties to *our privileges,* that arise from the relationship between dominant languages like English and mathematical symbols. "Mathematical symbols" does not mean visual-English symbols.

Ideology (and Ableism in mathematics education) is not limited to the (for example, visual) "form" of presenting mathematical ideas. Even the "content" carries ideology. Many students by their very dis/abilities, background and cultures find it much harder or impossible to grasp or construct the standard "content", and thus fail. Sowjanya [3] argues that "In our society, knowledge is not power but what constitutes knowledge and becomes acceptable to the upper-castes determines power. Hence the current education system could successfully prove dalits to be unmeritorious". Thus, in India, someone possessing "important" (mathematical or other) knowledge is very likely to come from an upper caste family.

Rather than addressing the systemic contradictions inherent in the caste system, however, many people accuse Dalits of perpetuating the caste system for relying on "reservations" (affirmative action) [4] rather than meritocracy.

Final words

My blind school experiences indicate that there is an alternative to the conservative "content" view of mathematics. My student's question about the emphasis in mathematics on paper and pencil is significant, for example. This blind student was resisting Ableism in mathematics education by asserting himself as a mathematics doer who is denied the right to self-determination in mathematics through the lack of validation of his form of mathematics. The alternative is to focus on the "process", rather than "content", leading to a broader and deeper learning, even of that "content". We need to create conditions where children question mathematical "facts" and can form their own mathematical ideas rather than lead them to "accept" why the dominant mathematical content is the "right" mathematics. When students challenge dominant mathematical concepts, such as the standard definition of even numbers, they perform acts of resistance against oppressive ideologies. We need to nurture their resistance through solidarity.

Notes

[1] The Caste System, which is still practiced in India and inherent to the Hindu religion, is an oppressive system of hierarchical social stratification premised on the enforcement of endogamy and family inherited professions which include manual scavenging, and untouchability. Caste (which I use synonymously with Brahmanism, to highlight the oppressor caste) makes it hard for women and non-Brahmins to access education. *Annihilation of Caste* by B. R. Ambedkar (a leading figure in the Anti-caste movement) is an instrumental text on caste. Gail Omvedt's writings provide a (historic) overview of the topic. http://roundtableindia.co.in/ is an extensive online resource for current writings on caste by young dalit-bahujan writers.

[2] How can we exclude the storyteller from the story being told? *Round Table India,* 7 April 2015. Retrieved from: http://roundtableindia.co.in/index.php?option=com_content&view= article&id=8135 on 17 October 2016

[3] Death of merit or merit of death. *Round Table India,* 25 January 2016. Retrieved from: http://roundtableindia. co.in/index.php?option=com_content&view=article&id=8447 on 17 October 2016

[4] "Reservations" is a term used for the affirmative action in which some college seats and government jobs are reserved for Dalits, Tribals, *etc.*

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From the archives

Editor's note: *The following remarks are extracted (and slightly edited) from an article by Christine Keitel (1986), who died earlier this year. The article, which was based on Keitel's plenary address at the 38th annual meeting of CIEAEM (Commission internationale pour l'etude et l'amelioration de l'enseignement des mathematiques), appeared in FLM6(3).*

We cannot deal with secondary school mathematics without considering the impact and role of computer technology for, and in, and beside mathematics education.

This does not need to be repeated here. A point, however, to which I would like to draw some attention, is the relation of both computer education and mathematics education to the field of "social needs" demands. By "social needs" demands I understand here the pressures urging school mathematics to comply with the needs for certain skills and abilities required in social practice. Mathematics education should qualify the students in mathematical skills and abilities so that they can apply mathematics appropriately and correctly in the concrete problem situations they may encounter in their lives and work. Conversely, social usefulness has been the strongest argument in favour of mathematics as a school discipline, and the prerequisite to assigning mathematics a highly selective function in the school system.

[...]

Viewing the role of social needs in and social control of our present day mathematics education, and confronting it with what we could imagine to be meaningful mathematics education, it is obvious in my opinion that these conceptions are so profoundly contrary to each other that any attempt at reconciling them would inevitably result in obstructing the success of either conception. Indeed I would suggest we ought to consider how far this basic dichotomy in our school mathematics might be the source of many traditional difficulties and failures, which we persistently try to overcome, and which obstinately remain. Isn't it this schizophrenia [*sic*] which makes us tell the student that everybody has a good chance to learn mathematics, knowing at the same time that examinations by their very construction have to ensure a certain percentage of failures? Isn't it schizophrenia that we invite them to do creative mathematics and yet let them work for examinations? I think that children who suffer from school mathematics are not really suffering from mathematics but from this schizophrenia, which affects them quite considerably.

Keeping this in mind, let us turn back to the competitive relation of mathematics education and computer education. It is astonishing to realize that, quite differently from the case of mathematics education, there seems to be a particular affinity of computer education for what we may call the social needs and control approach. [...] All the more important processes which pertain to understanding cannot be done by a computer (although the computer may be used there in a subordinate function): the processes of structuring the problem context, of explicating an instrumental level of treatment, of translating to and fro between different levels of formal explicitness until eventually a problem solving model develops; and again the interpretation of the solution at the level of concrete significance, and the feedback to the levels of mathematical and reality understanding—in none of this can the computer replace the applier's brains.

On the contrary, in our model of skill-oriented application, where understanding is of no or less importance, the whole process, except for the identification of the problem type, can be carried out by the computer. And if we may imagine that in a restricted field of application the problem-solving pattern could be chosen by the computer as well, the application shrinks to the simplest stimulus-response bond: one has but to push the button. This then requires neither mathematics nor informatics—except for the computer specialist, who needs both.

May I add here—though this is actually another topic—that the computer need not only be employed for reductive purposes. We could as well imagine placing the computer in the center of a problem-structuring process as an agile turntable allowing speedy reflections between formal mathematics and concrete reality. [...]

This is not a model of computer education, but of integrated mathematics education and computer education, and could moreover integrate mathematics education with other disciplines such as geography, economics, biology, social sciences, *etc*., as well.

The affinity between computer education and a traditional needs-and-control approach, contrasted with the problems mathematics education proves to have in this domain notwithstanding all reform efforts, has of course attracted the attention of those representatives of society who wish to keep the school on the tight rein of their demands, and of those within school who take it as the highest aim of education to comply with these demands. And in fact we register that the interest, and trust, of the advocates of what they call usefulness are rapidly shifting towards computer education. And that certainly frightens many of us. What can we infer from our previous findings as perspectives on this situation?

As my conclusion I shall try a few answers, which are, however, very tentative and maybe partly utopian. They do not pretend to certainty.

The disease of mathematics education in my view is the inert dichotomy between a direct needs obligation and the