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**A critique on the role of social justice perspectives in mathematics education**

Review of B. Sriraman (Ed), *International perspectives on social justice in mathematics education*. Monograph 1, *The Montana Mathematics Enthusiast*. Montana Council of Teachers of Mathematics & The University of Montana Press, 2007. 185 pp. ISSN 1551-3440 \$20 (pb). (Order via <http://www.math.umt.edu/TMME/Monograph1/>).

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**Introduction**

The aim of this critical notice is to review the Monograph: “International Perspectives on Social Justice in Mathematics Education. It is not a chapter by chapter summary of each of the book’s 14 chapters per se, but rather a review around three overarching themes under which various chapters fit in. The chapters in question are summarised and discussed under these themes with a few final thoughts added at the end.

**Theme 1: What is relevant to learn if one is a native student?**

Goos, Lowrie, and Jolly write Chapter 2 titled: “*Home, school and community partnerships in numeracy education: An Australian perspective*”. This chapter discusses two cases of partnerships between families, schools, and communities using the Mobile Pre-School Pilot Program. This program develops pre-school programs and materials to distribute to Indigenous children aged 3-5 years in remote locations in Australia’s Northern Territory. The aim is to increase enrolment, attendance, and participation of Indigenous children and prepare them for formal schooling through pre-literacy and pre-numeracy materials. Teachers travel with a play-pack and introduce the materials to the local teaching support officer, which in most cases is an Indigenous person chosen by the community. One of the issues mentioned is that some of the toys, such as traffic lights and city-based transport, might not be meaningful for children whose daily life is in the Aboriginal homelands. However, the local people insisted that the children became familiar with the world beyond their own communities. In

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Chapter 5 entitled: “*Some tensions in mathematics education for democracy*”, Christiansen suggests four links between mathematics education and democracy, viz., (1) learn to relate to authorities’ use of mathematics; (2) learn to act in a democracy; (3) develop a democratic classroom culture; and (4) access. Based on four narratives from Denmark, South Africa, and the USA, she discusses various aspects of democracy and mathematics education. One narrative was about South African students working on a task about land distribution between whites and blacks in South Africa. This raised the question of what is considered relevant by the students. The task reminded them about being considered worth less than whites and they did not want to spend time on tasks that would not give them the mathematical competencies they needed to do well in examinations and jobs. She also argues that democracy in relation to education is not only about students being empowered, but also about the teachers’ empowerment to have a say in how the curriculum looks and an obligation to stay well informed and critical. Zevenbergen and Flavel write Chapter 6 titled: “*Undertaking an archaeological dig in search of pedagogical relay*”. The authors discuss why some students are more inclined to succeed/ fail in schools than others. They draw on Bernstein’s notion of the pedagogic relay to argue that both mathematics and culture are relayed to students through the pedagogical practices in mathematics classroom. Through teaching school mathematics, teachers enculturate students into a particular way of seeing and acting in the social world. The authors claim that it can be seen as a mathematics culture of the middle class Western type, hence, those students whose culture is not that of the pedagogical relay, learning mathematics is just as much about the hegemonic culture being relayed through the school mathematics culture. They then discuss how seeing a classroom as an archaeological site and using archaeological methods can identify elements of practice of teaching mathematics. By digging through the remnants left in classrooms, artifacts can reveal much about the culture of the site. They also give an example of such a study.

Amit, Fried, and Abu-Naja write Chapter 7 titled: “*The mathematical club for excellent students as common ground for Bedouin and other Israeli youth*”. This chapter is about an after-school mathematics club aimed at mathematically talented and interested middle and early high school students. The club is integrative, which means that besides developing mathematical inclinations and skills it also brings together Bedouin and Israeli Jewish students. The authors discuss integrative versus non-integrative approaches. The latter can place the Bedouins’ at the centre of the effort but it might further a state of segmentation. The former cannot focus solely on the Bedouins’ needs and they are in a setting where they might not feel at home. However it has the advantage of forming a community of learners

and creating a sense of cooperation as mathematical problem-solving demands listening to critique no matter who says it and working together to solve the problems. This makes it a source of democratic value. It also seemed to have extended beyond the students directly involved and reached the greater community. Shockey and Gustafson contribute Chapter 8 titled: *“Some thoughts on passive resistance to learning”*. The chapter mentions that the requirements and expectations of the students in Native American schools might not fit the children’s reality. An example of this is dog pens that do not exist in the Native’s world. It also reports on a Math Night where grand parents, aunts and uncles helped in making this a good experience for the children. The authors remark that they cannot find a 7<sup>th</sup> grader a mathematics text that is relevant to their culture. They argue that perhaps mathematics is not mathematics if one’s culture has an entirely different way of looking at quantity and measurement. Some of the students might also fear that they will not any longer be Native if they learn “this stuff”. The authors state that perhaps the most difficult challenge is the student who does not engage no matter what they try and they hypothesize that a contributor to this is the fact that new knowledge is not built on the existing knowledge of these Native youth. The authors want to hear what the resistant learners think about teaching and learning, which is the objective of their next project.

Skovsmose, Alrø, and Valero write Chapter 13 titled: *“Before you divide, you have to add’ inter-viewing Indian students’ foregrounds”*. The authors argue that seeing mathematics education in relation to equity implies that one does not only focus on whether the students understand the mathematical concepts, one also needs to consider the students’ foreground, that is, the students’ perception of their future possibilities. The chapter states that the Brazilian Indian students may experience a borderland position where, on the one side, they can preserve some of their traditions and ways of living, however only in an environment that might be overrun by industrial interest; on the other hand, they are aware of the strengths and powers of Western civilisation in terms of possibilities for improving life conditions such as health care. The question being raised is how this situation influences the students’ foregrounds and motives for learning. The students being inter-viewed in this chapter, wanted to pass the examinations, not to leave the village, but to be able to help their people.

One of the key areas that these six chapters discuss is what might a Catch-22 between, the traditions and values of the child’s home culture including its meanings and ways of quantifying, the lack of power and benefits such as health care, on one hand; and an alien culture and knowledge system, potential loss of identity and traditions but with the

prospect of power, health benefits and economic development, on the other hand. Being put this way, it is not an easy choice. This is a very important discussion being raised and the various chapters give a really good insight into the various problems, potentials, and dilemmas from different parts of the world. I would therefore like to add a few thoughts around the areas too. It might not be an either-or situation. The economic development that might follow from knowledge of (Western) mathematics could actually make it possible for the natives to preserve their culture – probably not an exact copy of the ways of the past, but it could be a developed version of their culture, but a development that they have decided on and are in charge of. Furthermore, we may not need to be so afraid of losing the home culture’s way of thinking, or the identity of being “Native”. Science education literature discusses conceptual change theories (Duit & Treagust, 1998)<sup>2</sup> and explains that this term denotes that the learning of concepts and principles will usually involve a major restructuring of the students’ preinstructional conceptions. But ‘change’ does not mean that the students’ preconceptions have to be eliminated. In fact, usually the ‘old’ ideas stay ‘alive’ in particular contexts. I will not, at this point go any deeper into a discussion of these theories, but instead suggest that these approaches might show a way out of the above mentioned dilemma since conceptual change approaches yield that these could easily live side by side, and the students could learn where the “outside” ideas are the most appropriate tools to handle a certain situation.

## **Theme 2: Political and ethical reasons behind mathematics education**

Sriraman writes *Chapter 1* titled: “*On the origins of social justice: Darwin, Freire, Marx, and Vivekananda*”. This chapter discusses the deeper reasons for inequalities. Why do they exist? What are their origins? How do we change status quo? Here Sriraman refers to the positions of Darwin, Freire, Marx, and Vivekananda. One of the issues raised is that to be able to be free from oppression at a societal level, the individuals’ first need to free themselves. Sriraman argues that if individuals do not subjectively and intrinsically feel free, how can any educational or social mechanism make this happen no matter how well the intention? The author also problematizes OECD’s PISA programme and raises the issue if it represents only the interests of the citizens in the developed countries while not creating awareness of inequalities. At the end, Sriraman refers to Freire and writes that it is not possible to completely empower people; what we can do is to create opportunities that

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<sup>2</sup> Duit, R. & Treagust, D. F. (1998). ‘Learning in Science - From Behaviorism Towards Social Constructivism and Beyond’. In Fraser, B. J. & Tobin, K. G. (eds.) *International Handbook of Science Education*, pp. 3-25.

support them in empowering themselves. Each of the chapters in the monograph can be regarded as various actions taken to have education creating real meaning.

*D'Ambrosio*, the founder of the ethno-mathematics movement writes on “*Peace, Social Justice and ethnomathematics*” (Chapter 3). He writes about various types of peace, particularly social peace, which he links to social justice. He states that survival with dignity is the most universal problem facing mankind and he claims that technological, industrial, military, economic and political complexities can be blamed for the growing crises threatening humanity. He then states that mathematics is the most universal mode of thought and that mathematics has played a part in developing these complexities. He raises the question if these two universals are conflicting or complementary. His ‘Program Ethnomathematics’ is a response to his view of the responsibility of mathematicians and mathematics educators. He states that to build a civilization that rejects inequity, arrogance, and bigotry, education must give special attention to the redemption of subordinated peoples and to the empowerment of excluded sectors of societies. He therefore proposes a modern *trivium*: literacy (the capability of processing and interpreting information, including numeracy), matheracy (the capability of inferring, proposing hypotheses, and drawing conclusions from data) and technoracy (the critical familiarity with technology). Long term readers of MTL may remember his seminal chapter on this new trivium in vol.1,no2.

Mukhopadhyay and Greer write a provocative chapter entitled “*How many deaths? Education for statistical empathy*” (Chapter 11). The authors coin the term ‘statistical empathy’ for the ability to relate statistical data to the reality they stand for. They refer to historical and contemporary visual and artistic expressions and representations of mass killings. The chapter quotes numerous events and numbers of killings. They also discuss what this means for mathematics education and argue that it has been widely documented that people in general have a weak understanding of numerical data. In particular it is difficult for many people to grasp the meaning of large numbers. The media is full of terms such as “statistical dead heat”, which only a small part of the voters understand. They argue that understanding such things should be a part of what is considered adequate mathematical education. They also argue that mathematicians too often adopt a stance of neutrality, distancing their work from its impact on people’s lives. Instead the authors, referring to *D'Ambrosio*, raise the question of what are the ethical responsibilities of mathematicians and mathematics educators ?

*Bjarnadóttir* writes a chapter called: “*Fundamental reasons for mathematics education in Iceland*” (Chapter 12). The author explains the historic development of mathematics education on Iceland. This development was linked to being under Danish rule until the 20<sup>th</sup> century and she analyses it in the light of various fundamental reasons for mathematics education including: contributing to the technological and socio-economic development of society; contributing to society’s political, ideological and cultural maintenance and development; and giving individuals the prerequisites that may help them cope with life in various spheres. The author discusses why the Icelanders left out mathematics education for long periods. She argues that the most common need of the general public for mathematics, trade, was minimal. There were, however, moments when a decision was taken to practice mathematics education for the benefit of society, supported by influential individuals who knew the capacity of mathematics education. There were also moments when there were no such individuals present and mathematics education was left out. This chapter lacks a critical perspective of historical events but is interesting for the reader not well versed in Danish colonial history.

Taken together these four chapters raise a very important discussion about whether mathematicians and mathematics educators have an ethical responsibility, how mathematics and statistics can be used, and misused, to represent data and how important it is that the general public can, so to speak, read behind the numbers. They also point to the importance of individuals, both in terms of freeing themselves, but also in terms of how individual *can* make a difference in terms of influencing if and when mathematics education should take place. However there are also incidents of phrases and statements that indicate that certain values are taken to be shared between the reader and the author. For instance when the creation of new weapons per definition seems to be bad. Why is that? Without military weapons, I would argue, Hitler would never have been defeated. Also phrases such as “In the current political climate of the United States...” blemish the monograph at places. These views are certainly valid, but a little more reasoning and discussion of them would have been better.

### **Theme 3: Closing the gap**

Noyes writes Chapter 4 titled: “*Mathematical marginalisation and meritocracy: Inequity in an English classroom*”. This chapter is about two ten-year old pupils in their final year of primary school education. Both only live with their mothers, but otherwise their situation is very different. Noyes examines how the broader family social milieu impacts upon their

mathematics learning trajectories. Drawing on Ole Skovsmose's seminal writings on critical mathematics education, the basic assumption is that mathematics has formatting power both through its application in science, business, and society, but also through the way it is used to organise people. His main focus is how mixed groups of learners get sifted through their mathematics education and what happens in a particular school for children with quite different social, economic, and cultural resources. He argues that to prevent the marginalisation of some pupils, the teachers need to be educated to recognise the political nature of knowledge. He states that the real difference between the two pupils' mathematical trajectory is social distinction. Knott contributes a chapter entitled: "*Issues of status and values in the professional development of mathematics teachers*" (Chapter 9). This chapter is about a professional development program for K-12 mathematics teachers in the state of Oregon that addresses the issue of status in classrooms. Low status students speak less often, are being more ignored, are physically separate from their group etc. Ethnicity, race, socio-economic status, society status, gender, reading ability etc. can give rise to status issues in the classroom. Knott argues that it is neither possible nor desirable to eliminate status completely as it might create expectations for performance and encourages competence for some, but it is possible and desirable to nullify its negative effects. High status students are expected (from peers and teachers) to contribute immediately to the group process. They begin to expect this of themselves, which quickly builds on itself. The opposite happens with low status students. Students must be taught how to participate successfully in group activities. Awareness in recognising and dealing with status issues in group activities was therefore part of the program. The teachers practiced the various team roles and after two years in the program they reported positive results.

Gutstein writes *Chapter 10* titled: "*Connecting community, critical, and classical knowledge in teaching mathematics for social justice*". As opposed to the three R's, the author presents and synthesizes the "three C's": community, critical, and classical knowledge. Community knowledge is what people already know and bring to school. It is affected by popular misconceptions and myths. Critical knowledge is about the socio-political conditions of one's immediate and broader existence including knowledge of why things are the way they are. Classical knowledge refers to formal, in-school, abstract knowledge. Gutstein's focus is that the students are able to pass all gate keeping tests. The case is a school in a predominately Mexican area in Chicago. The public school board racially integrated the school by drawing the attendance lines into a bordering African American community. Now the school has 30% African Americans and 70% Latinos. This caused

problems. To make the students see that the differences between the communities were far outweighed by the commonalities, and that there were not enough quality schools for all students, Gutstein asked students mathematics questions about the numbers of black and brown students, ratios, census track data etc.

*Steinhorsdóttir and Sriraman write Chapter 14 titled: “Iceland and rural/urban girls – PISA 2003 examined from an emancipatory viewpoint”.* This chapter starts by discussing that research related to gender issues in mathematics are not as frequently published today as it was in the 1980’s and 1990’s. They also argue against the perception that today, boys are being short-changed in schools. The authors state that the gender gap has not been closed. In PISA 2003, the only country which had statistically significant gender differences in achievement in favour of the girls was Iceland. The authors investigate this and refer to studies in Norway and Sweden, which have found a high correlation between students’ reading comprehension and mathematical achievement. They argue that when the Icelandic data was analysed by controlling for reading comprehension, the males scored a little higher than females. This means that given the same level of reading ability, females can be predicted to score lower than males. This chapter is part of a larger on-going study on qualitatively explaining Iceland’s unusual PISA results.

The four chapters here discuss various attempts to close the gap between (1) high and low status students; (2) African Americans and Latino students; and (3) incidents where the gap might not be there, such as in the chapter about girls and boys on Iceland. Finally there is a chapter that discusses that pupils who from the outside might seem to be in a similar circumstance, might in fact be in very different circumstances, and that the teachers need to be aware of this to prevent marginalisation. These chapters are very interesting. Some of them reports promising and very interesting results while others exhibit the challenges in closing these gaps.

### **A few final comments**

Overall the monograph is a very coherent book discussing the theme of social justice in mathematics education from various perspectives, interpretations, and types of research. It has contributions from all over the world, all with the overall goal of creating social justice. It is easy to read. The typeset at places is not completely consistent. However, one can and should overlook this fact. In line with its theme, the book is not made for profit, actually one can download the book for free at <http://www.math.umt.edu/TMME/Monograph1/> .

I would very much encourage anyone interested in this field to read it. It offers a unique collection of perspectives and results on the role of mathematics education in creating a better world.