

# POLITICAL ISSUES IN MATHEMATICS EDUCATION

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*For Günter Törner,  
in honor of his 60<sup>th</sup> birthday.*

## Introduction

Almost ten years ago, I delivered the Paulo Freire Memorial Lecture, at the First Mathematics Education and Society Conference (MEAS1) in Nottingham, UK, September 6-12 1998. I started stating that my views on Mathematics Education reflected my perception that much of the problems modern society faces is reflected in a system of codes of behavior, anchored in current knowledge, which accepts facts and events with a character of “normality”. The apparent success and the dominant presence, in both the people and the decision making elites, of the *normopaths*, which are individuals who *a critically* conform to what is normal, very often lead to a generalized hindrance and even repression of creativity, through censoring and silencing individuals. This scenario is seen nowadays.

For decades we have been noticing that the search of new, alternative spaces, by those who have no voice, has been a high motivation for most youth action. As recent examples, I mention the emergence of “off-Broadway” theatre. I could refer to something from the early sixties, the “free-speech movement” led by Lenny Bruce and the students revolts in Paris and in many other cities around the World, in 1968. We can refer also to the proliferation of religious faiths and fundamentalism as the search of alternative for the very “normal” established institutional scenario. This proliferation might be called “off-Church” movement. And the increase in school failings and dropouts result in the “off-School” trend in youth behavior. While in the cases of drama and the churches there are institutionalized alternative spaces, off-School means the streets, teenage pregnancy, drugs, violence and youth criminality.

Much of the search for off-school spaces is a result of the insistence on teaching obsolete, useless and disinteresting subjects. As Simon Jenkins, a millennium commissioner and former editor of *The Times*, puts it, “pupils become very bored [school is disinteresting] ... and they do not see science as getting them jobs [science is useless]” *brackets are mine*<sup>2</sup>. Although Jenkins refers to science teaching, the situation with mathematics is considerably worst. We might very well add obsolete. I have many times written disinteresting, obsolete and useless.

It is clear that insisting on the three R's which still prevails in most school systems will not remedy school failings. Another emphasis is required, which focuses on relevant issues of today's society, responds to youth intellectual curiosity and agility, and prepares them for a future, which we can only guess how will

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<sup>2</sup> *The Times*, London, 8/09/98,p.8

it be? Particularly in education, we need a new thinking, which brings peace, justice, respect and solidarity.<sup>3</sup>

In the taped lecture Paulo Freire prepared for ICME 9, he recognized that mathematics is intertwined with all forms of human behavior and that there is a mathematical way of being in life. He essentially recognizes that his program of Critical Literacy cannot be complete without the recognition that mathematics underlies human and societal behavior.<sup>4</sup> This goes much beyond the acquisition of mathematical skills. In the Paulo Freire Memorial Lecture, I discussed, under the inspiration of his ideals, the role of Mathematics in building up a new civilization which rejects inequity, arrogance and bigotry.

### Political issues

Political issues deal with government, economics, relations among nations and social classes, people's welfare, the preservation of natural and cultural resources, and many other sectors of our life. The state of the world causes apprehension. The possibility of final extinction of civilization in Earth is real. Not only through war. We are witnessing an environmental crisis, disruption of the economic system, institutional erosion, mounting social crises in just about every country and, above all, the recurring threat of war<sup>5</sup>.

History shows us that mathematics is well integrated in the technological, industrial, military, economic and political systems and that mathematics has been relying on these systems for the material bases of its continuing progress. It is important to question the role of mathematics and mathematics education in the perverse behavior of mankind.

We have to look into history and epistemology of mathematics with a broader view. Particularly with respect to the cultures of the periphery, with the denial and exclusion of knowledge. This was so common in the colonial process, but still prevails in modern society. The denial of knowledge to individuals, particularly children, is of the same nature as the denial of knowledge which affects entire populations. To propose directions to counteract ingrained practices is the major challenge of educators, particularly mathematics educators. Large sectors of the population do not have access to full citizenship. Some do not have access to the basic needs for survival. This is the situation in most of the world and occurs even in the most developed and richest nations. Our hopes for the future depend on learning -- critically -- the lessons of the past. A scenario similar to the political disruption of the Roman Empire is before us, with the aggravation that the means of disruption are, nowadays, practically impossible to control.

We may consider survival with dignity the most universal problem. It is also generally agreed that mathematics is the most universal mode of thought. I see the understanding of the relation between these two universals as a step towards actions to avoid the bleak scenario of the future of civilization. Surely, mathematics offers the means to propose new approaches to human and social relations and to the relations with the environment. Consequently, I exhort mathematicians and mathematics educators to reflect about our personal role in looking for the ways our science can justify its advancements as means to achieve survival with dignity for the humanity.

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<sup>3</sup> See the interesting book by Richard A. Slaughter (ed.): *New Thinking for a New Millenium*, Routledge, London, 1996.

<sup>4</sup> A conversation with Paulo Freire, *For the Learning of Mathematics*, vol. 17, n.3, November 1997, pp.7-10.

<sup>5</sup> See Sriraman,B. (2007). On the origins of social justice: Darwin, Freire, Marx & Vivekanda. . In B. Sriraman (Ed), *International Perspectives on Social Justice in Mathematics Education*, Monograph 1, The Montana Mathematics Enthusiast, pp.1-6.

Although specially referring to the threat of Nuclear War, the appeal of the Einstein-Russell Manifesto, of 1955, applies equally well to the current state of the world:

“We appeal, as human beings, to human beings: Remember your humanity and forget the rest. If you can do so, the way lies open for a new paradise; if you cannot, there lies before you the risk of universal death.”<sup>6</sup>

The nature of mathematical behavior is not yet clearly understood. Although in Classical Philosophy we can notice a concern with the nature of mathematics, only recently the advances of cognitive sciences have probed into the generation of mathematical knowledge. How is mathematics created? How different is mathematical creativity from other forms of creativity?

### **History and Education**

From the historical viewpoint, there is a need of a complete and structured view of the role of Mathematics in building up our civilization. For this we have to look into the history and geography of human behavior and find new paths in the measure we advance in the search. History is a global view in time and space, and it cannot be focused only on the narrow geographic limits of a few civilizations which have been successful in a short span of time. This limited view favors History as a chronological narrative of events, focused in results and heroes. Consequently, this leads to a biased view of history, which favors interests of groups.

The course of the history of mankind, which can not be separated from the natural history of the planet, reveals an increase interdependence which crosses space and time, of cultures and civilizations and of generations.

Education is a strategy created by societies to promote creativity and citizenship. To promote creativity implies helping people to fulfill their potentials and raise to the highest level of their capability. To promote citizenship implies showing them their rights and responsibilities in society<sup>7</sup>. Educational systems throughout history and in every civilization have been focusing on two issues: to transmit values from the past and to promote the future. In other words, education aims equally at the new (creativity) and the old (societal values).

But we should be very concerned with irresponsible creativity — for we do not want our students to become bright scientists creating new instruments of oppression and mass destruction – and with docile submission to societal values -- for we do not want our students to accept rules, norms and codes which violate human dignity. This is our challenge as educators, particularly as mathematics educators.

The strategy of educational systems to pursue these goals is the **curriculum**. Curriculum is usually organized linearly, in three strands: objectives, contents and methods. Thus, the curriculum emerges from the acceptance of the social aims of educational systems, then the identification of contents which may help to reach the goals and, finally, in the development of methods to transmit these contents.

### **The political dimension of mathematics education**

The political dimension of mathematics education must be analyzed in the three strands of the curriculum: objectives, contents, methods. The political discourse about mathematics education normally focuses on the objectives. Very rarely has mathematics contents and methodology been examined under this dimension. Some educators and mathematicians claim that contents and methods in mathematics have nothing to do with the political dimension of education.

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<sup>6</sup> <http://www.pugwash.org/about/manifesto.htm> accessed July 30, 2007.

<sup>7</sup> D’Ambosio, U. (2007). Peace, Social Justice, Ethnomathematics. In B. Sriraman (Ed), *International Perspectives on Social Justice in Mathematics Education*, Monograph 1, The Montana Mathematics Enthusiast, pp. 25-34

Even more disturbing is the possibility, in a world convulsed by wars, of conveying to the children war is unavoidable, so they must be uncritically prepared for it. Since Mathematics is the imprint of the Western thought, it is naïve not to look into a possible role of mathematics in framing a state of mind which tolerates war. Our responsibility as mathematicians and mathematics educators is to offer venues of peace.<sup>8</sup>

There is an expectation about our role, as mathematicians and math educators, in the pursuit of peace. The remark below by Anthony Judge, the Director of Communications and Research of the Union of International Associations, express how we, mathematicians, are seen:

"Mathematicians -- having lent the full support of their discipline to the weapons industry supplying the missile delivery systems -- would claim that their subtlest thinking is way beyond the comprehension of those seated around a negotiating table."<sup>9</sup>

I see my role as an Educator and my discipline, Mathematics, as complementary instruments to fulfill commitments to mankind. In order to make good use of these instruments, I must master them, but I also need to have a critical view of their potentialities and of the risk involved in misusing them. This is my professional commitment.

It is easily recognized that Mathematics provides an important instrument for social analyses. Western civilization entirely relies on data control and management. Social critics will find it difficult to argue without an understanding of basic mathematics. But, regrettably, the term "basic" has been abusively identified with a *critical* skill and drilling.

It is an undeniable right of every human being to share all the cultural and natural goods needed to her/his material survival and intellectual enhancement. This is the essence of the *Universal Declaration of Human Rights* (1948), to which every nation is committed. The educational strand of this important profession on mankind is the *World Declaration on Education for All* (1990), to which 155 countries are committed. Of course, there are many difficulties in implementing the effectiveness of the United Nations resolutions and mechanisms. But as yet this is the best instrument available that may lead to a planetary civilization, with Peace and dignity for the entire mankind. Regrettably, Mathematics Educators are generally unfamiliar with these documents.

It is an un-relinquishable duty to cooperate, with respect and solidarity, with all the human beings, who have the same rights, for the preservation of all these goods. This is the essence of the **ethics of diversity**: respect for the other (the different); solidarity with the other; cooperation with the other. This leads to quality of life and dignity for the entire mankind. It is impossible to accept the process of exclusion of large sectors of the population of the World, both in the developed and undeveloped nations. An explanation for this perverse concept of civilization asks for a deep reflection on the colonial period. It is not the case of putting the blame in one or another, neither to attempt to redo the past. But to understand the past is a first step to move into the future. To accept inequity, arrogance and bigotry is irrational and may lead to disaster. Mathematics has everything to do with this state of the world. A new world order is urgently needed. Our hopes for the future depend on learning -- critically! -- the lessons of the past.

We have to look into history and epistemology with a broader view. The denial and exclusion of the cultures of the periphery, so common in the colonial process, still prevails in modern society. The denial of knowledge

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<sup>8</sup> Ubiratan D'Ambrosio: Mathematics and peace: Our responsibilities, *Zentralblatt für Didaktik der Mathematik/ZDM*, Jahrgang 30, Juni 1998, Heft 3; pp.67-73.

<sup>9</sup> Anthony Judge: And when the bombing stops? Territorial conflicts as a challenge to mathematicians, <http://www.uia.org/uiadocs/mathbom.htm> accessed July 30, 2007.

which affects populations is of the same nature as the denial of knowledge to individuals, particularly children. To propose directions to counteract ingrained practices is the major challenge of educators, particularly of mathematics educators. Large sectors of the population do not have access to full citizenship. Some do not have access to the basic needs for survival. This is the situation in most of the world and occurs even in the most developed and richest nations.

In order to build up a civilization which rejects inequity, arrogance and bigotry, education must give special attention to the redemption of peoples that have been for a long time subordinated and must give priority to the empowerment of the excluded sectors of societies. The Program Ethnomathematics contributes for restoring cultural dignity and offers the intellectual tools for the exercise of citizenship. It enhances creativity, reinforces cultural self-respect and offers a broad view of mankind. In everyday life, it is a system of knowledge which offer the possibility of a more favorable and harmonious relation in human behavior and between humans and nature.<sup>10</sup> A consequence of this program for a new curriculum is synthesized in my proposal of three strands in curricular organization: **Literacy, Matheracy and Technoracy.**<sup>11</sup>

**Literacy:** Clearly, reading has a new meaning today. We have to read a movie or a TV program. It is common to go to a concert announced as a new reading of Chopin! Also socially, the concept of literacy goes through many changes. Nowadays, “reading” includes also the competency of numeracy, interpretation of graphs, tables and other ways of informing the individual. And also understanding the condensed language of codes. These competencies have much more to do with screens and button than with pencil and paper. There is no way for reverting this trend, the same as there was no successful censorship in preventing people to have access to books in the last 500 years. Getting information through the new media precedes the use of pencil and paper and numeracy is dealt with calculators. But, if dealing with numbers is part of modern literacy, where has mathematics gone?

**Matheracy:** is the capability of drawing conclusions from data, inferring, proposing hypotheses and drawing conclusion. It is a first step towards an intellectual posture, which is almost completely absent in our school systems. Regrettably, even conceding that problem solving, modeling and projects can be seen in some mathematics classrooms, the main importance is given to numeracy, or the manipulation of numbers and operations. Matheracy is closer to the way Mathematics was present both in classical Greece and in Indigenous cultures. The concern was not with counting and measuring, but with divination and philosophy. Matheracy, this deeper reflection about man and society, should not be restricted to the elite, as it has been in the past.

**Technoracy:** is the critical familiarity with technology. Of course, the operative aspects of it are, in most of the cases, inaccessible to the lay individual. But the basic ideas behind the technological devices, their possibilities and dangers, the morality supporting the use of technology, are essential questions to be raised among children in a very early age. History shows us that ethics and values are intimately related to technological progress.

The three together constitute what is essential for conscious citizenship in a world moving fast into a planetary civilization.

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<sup>10</sup> Ubiratan D’Ambrosio: Ethnomathematics and its First International Congress, *Zentralblatt für Didaktik der Mathematik*, ZDM 99/2;pp.50-53.

<sup>11</sup> Ubiratan D’Ambrosio: Literacy, Matheracy, and Technoracy: A Trivium for Today, *Mathematical Thinking and Learning*, 1(2),1999;pp.131-153.

