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Excellence and equity in education and talent development: Components of a Hegelian dialectic

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ABSTRACT: *In this paper we outline the fundamental tension between the notions of equity and excellence within educational structures in the U.S and other parts of the world in relation to the education of talented students. We explore the place of mathematics in school curricula, examinations and society and its special but paradoxical role in both perpetuating inequity as well its power in raising critical awareness in students and initiating positive changes to end societal inequities. The Hegelian dialectic is used to understand the necessary tension between the notions of equity and excellence in order to lead to a forward moving and positive synthesis for the betterment of society.*

Key words: creativity; crisis in education; dialectic; east versus west; educational structures; excellence; equity; gifted education; moral and ethical literacy; social justice; mathematics talent development

INTRODUCTION

Gifted education in the United States has been subject to much criticism due to the perception that it is either elitist, or caters to students who are socio-economically privileged (Clark, 1997). Some theorists have also reduced this problem to that of nature versus nurture, i.e., students who are labeled academically promising or gifted are more likely to have received the benefits of a socio-cultural upbringing where reading, music and other creative activities are encouraged with parents providing additional support for children to pursue intellectually stimulating activities. This is in contrast to students that have not had the privilege of growing up in an intellectually stimulating social environment. Gifted education is also construed as being elitist because it caters to the needs of a small proportion of students based on identification measures which may be biased. There is also considerable debate over the definitions of giftedness with the

word "gifted" lending itself to negative connotations. On the other hand, public schools in the U.S do provide a lot of resources towards students in need of remediation in reading and mathematics at the elementary levels. Kent & Lawrence (2002) pointed to the fact that in the U.S, on an average $30 billion is spent on special education programs, whereas funding for gifted education is less than 1% of this amount.

If we view catering/nurturing talent of students that are academically promising as being elitist, then are we not being "unjust" towards the abilities of these students and squandering the opportunity to develop their talent. So, addressing this issue becomes a catch-22 situation unless we try to construct a completely different theoretical perspective which moves away from the regressive and dogmatic spirals of various arguments. According to Sriraman (2005) it is a basic fact that the comforts and security of today's technologically evolved society is due to the innovative spirit and the toil of scientists, inventors, investors, artists and leaders who have made the present comfortable state possible. In a similar vein, Martinsen (2003) in his introduction to a special issue of the *Scandinavian Journal of Education* focused on creativity wrote:

> *"Despite differences of opinion as regards the definition of this construct it can be argued that creativity is fundamental to all individual and societal development. Societies need inventors, creative artists, managers, teachers, authors, philosophers, entrepreneurs, therapists and more. Moreover, most people will need to restructure their understanding, find new solutions, new challenges and new ideas frequently during their lifetime. One may also suspect that the capacity to create and to solve complex or novel problems will become more and more important in an increasingly regulated, technology-oriented and complex world."*(p.227)

WHY MATHEMATICS EDUCATION?

The field of mathematics has been criticized for its academic elitism. There is a growing canon of studies which indicates that the institution of mathematics tends to marginalize women and minorities (Burton, 2004; Herzig, 2004). Moreover several studies have shown that the knowledge produced by the institution of mathematics is based on a patriarch-al structure and a male-centered epistemology. There is also adequate empirical evidence in the U.S that academic fields related to mathematics continues to be predominantly male (Seymour, 1995). Further, in the U.S, the representation of minorities (African America, Native American) at the post-graduate level is still miniscule (Seymour & Hewitt, 1997; Sriraman & Steinthorsdottir 2007a, 2007b). Mathematics has also historically served as the gatekeeper to numerous other areas of study. For instance the hard sciences, schools of engineering and business typically rely on the Calculus sequence as a way to filter out students unable to fulfill program pre-requisites. In numerous countries around the world, particularly in Asia, entry to government subsidized programs in engineering and the sciences is highly competitive

and require students to score in the top 1 percentile in entrance exams in which mathematics is a major component. The situation is not so different in North America as evidenced in the importance of standardized tests like SAT or ACT to gain entry into college programs. It is not uncommon to hear politicians use schools' performance on mathematics assessments as a reference point to criticize public school programs and teachers (e.g., the passing of the No Child Left Behind Act in the U.S).

MATHEMATICS EDUCATION: DEMOCRATIZATION AND GLOBALIZATION

Based on the previous paragraphs, we can say that mathematics education has everything to do with today's socio-cultural, political and economic scenario. In particular, mathematics education has much more to do with politics, in its broad sense, than with mathematics, in its inner sense (D'Ambrosio, 1990, 1994a, 1994b, 1998, 1999, 2007; Moreno & Trigo, 2007; Sriraman & Törner, 2007). Mathematics seen in its entirety can be viewed as a means of empowerment as well as a means to oppress at the other end of the spectrum. For instance Schoenfeld (2004) in his survey of the state of mathematics education in the U.S wrote "Is mathematics for the elite or for the masses? Are there tensions between "excellence" and "equity"? Should mathematics be seen as a democratizing force or as a vehicle for maintaining the status quo?" (p.253). Skovsmose (2004) poses the questions: Is it true that mathematics has no social significance? Or does also mathematics provide a crucial resource for social change? in other words: How may mathematics and power be interrelated? We further ask what does this have to do with current educational structures and pedagogy. Skovsmose (2005) further discusses critically the relations between mathematics, society and citizenship. Skovsmose's program of critical mathematics education give challenges connected to issues of globalization, content and applications of mathematics, mathematics as basis for actions in society, and on empowerment and mathematical literacy (mathemacy).

These questions are more generally addressed by Spring (2006), who summarizes the relationship between pedagogies and the economic needs of nation/states. His thesis is that the present need for nation/states to prepare workers for the global economy has resulted in the creation of an "educational security state" where an elaborate accountability-based system of testing is used to control teachers and students. Spring correctly points out that:

> *Both teachers and students become subservient to an industrial–consumer paradigm that integrates education and economic planning. This educational model has prevailed over classical forms of education such as Confucianism, Islam, and Christianity and their concerns with creating a just and ethical society through the analysis and discussion of sacred and classical texts. It has also prevailed over progressive pedagogy designed to prepare students to reconstruct society. In the 21st century, national school systems have similar*

> *grades and promotion plans, instructional methods, curriculum organization, and linkages between secondary and higher education. Most national school systems are organized to serve an industrial–consumer state. As later explained, the industrial–consumer state is premised on the idea that a good society involves economic growth resulting from increased production and consumption of goods. In the industrial–consumer state, education is organized to serve the goal of economic growth.* (p.105).

Therefore, in order to counter this organized push for eliminating progressive education, it is important that educators be open to alternative models of pedagogies which attempt to move beyond the current dominant "industrial consumer state" model of education. In order to do so, it is imperative that we first understand the dichotomy between excellence and equity in mathematics education. The general questions we raise in this article are:

(1) Is there a way in which one can resolve talent development, particularly in mathematics education so that that the curriculum and/or instruction is equitable to all the students in the classroom?

(2) Can excellence and equity co-exist or does attending to one compromise the other, i.e., excellence at the sacrifice of equity; equity at the sacrifice of excellence?

REFORMULATING THE PROBLEM WITHIN A HEGELIAN DIALECTIC

In western philosophy, the use of dialectics is seen in ancient Greek philosophy (e.g., Socrates, Plato etc). The dialectic consists of theses and anti-theses which are in opposition to each other. The tension between these two opposing forces eventually leads to a synthesis which in turn becomes the thesis of a new dialectic. It should be noted though that the idea or concept of a dialectic is much older and found in Hindu and Buddhist philosophy. It was however, Hegel (1770-1831), who applied the dialectic method to create a model of a direction in which history unfolds. Although Hegel was in very abstract terms speaking of this evolution towards an absolute idea (a kind of philosophical idealism), his dialectic was also applied by Marx towards material conditions to formulate what is known as the Marxist dialectic or dialectical materialism. Figure 1 shows a visual representation of Hegel's dialectical model.[1] The Hegelian dialectic is very applicable to the problem of resolving the tension between the opposing forces of excellence and equity within the framework of education. The tension between these opposing forces is seen in educational systems in numerous parts of the world. We present some examples and urge the reader to attempt to apply the dialectic to resolving this issue.

[1] Figure reprinted with permission from Daniel Waldspurger
http://www.calvertonschool.org/Waldspurger/pages/hegelian_dialectic.htm

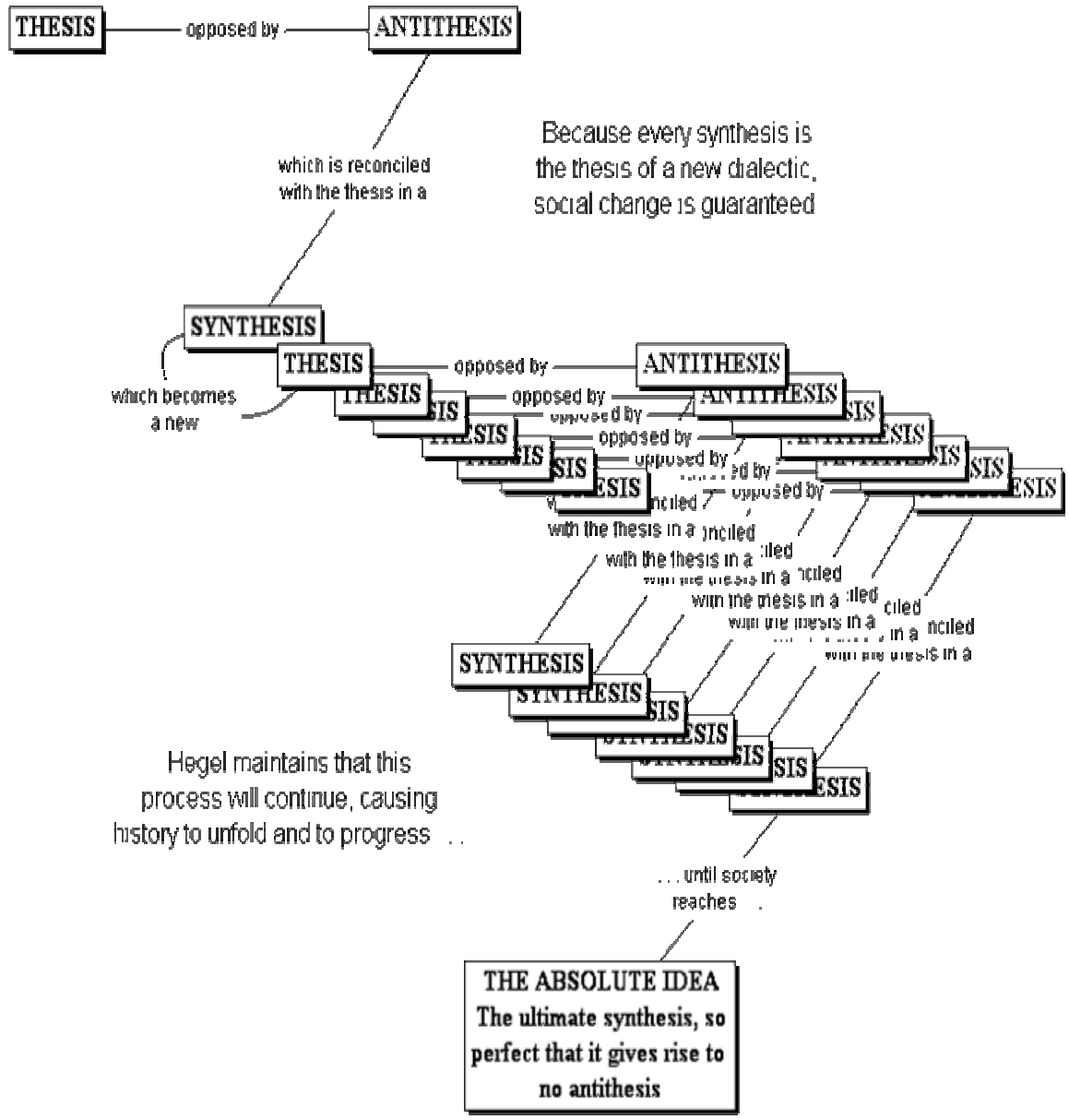

Figure 1: The Hegelian Dialectic

EAST VERSUS WEST

Educational systems are heavily influenced by the social and cultural ideologies that characterize the particular society (Clark, 1997; Kim, 2005; Spring, 2006). Kim (2005) characterizes "western" systems of education as fostering creativity and entrepreneurship when compared to "eastern" systems where more emphasis is laid on compliance, memorization and repetitive work. However East Asian countries stress the values of effort, hard work, perseverance and a general high regard for education and teachers from society with adequate funding for public schools and family support. Again in comparison, in the U.S., public schools are poorly funded, teachers are in general not adequately compensated nor supported by parents, and there is a decline in the number of students who graduate from high school (Haynes & Chalker, 1998; Hodgkinson, 1991). Among the western developed democratic nations, the U.S has the highest prison population proportion, 30% of whom are high school dropouts (Hodgkinson, 1991).

In China, Japan and Korea, the writings of Confucius (551-479 BCE), namely a system of morals and ethics, influenced the educational systems. The purpose of studying Confucian texts was to create a citizenry that were moral and worked toward the general good of society. Competitive exams formed a cornerstone of this system, in order to select the best people for positions in the government. The modern day legacy of this system is the obsession of students in these societies to perform well on the highly competitive college entrance exams for the limited number of seats in the science and engineering tracks. The tension and contradiction within this system is apparent in the fact that although these societies value education, the examination system is highly constrictive, inhibits creativity and used to stratify society in general. Late bloomers do not have a chance to succeed within such an educational system. In the U.S., despite the problems within the educational system and the general lack of enthusiasm from society to fund academic programs that benefit students, the system in general allows for second-chances, for individuals to pursue college later in life in spite of earlier setbacks. On the other hand, for many students, particularly from poorer school districts, socio-economic circumstances may not allow for such second chances. The U.S model of an industrial-consumer state based on the capitalistic ideal of producing and consuming goods, forces students into circumstances which make it economically unfeasible particularly for students from poor socio-economic backgrounds to veer vocations and pursue higher education. Clearly both systems, based on different ideologies have strengths and weaknesses that are a function of their particular historical and cultural roots. Social change is possible within and across both systems but requires changes within cultural and socio-political ideals of eastern and western societies. Both systems have intrinsic flaws that undermine developing the talents of students. There are however solutions proposed by numerous educational philosophers and activists which reveal a synthesis of eastern and western ideas and provide for the possibility of systemic change for society as presented in the Hegelian dialectic.

PROGRESSIVE EDUCATION AND CRITICAL PEDAGOGIES

The principles of progressive education as outlined by John Dewey inspired educational structures in the former Soviet Union and China in the early part of the 20th century and ironically have been forgotten by policy makers in the U.S and today viewed as a "dissenting" tradition (Spring, 2006). The goal of the progressive movement was to empower students by attending to student strengths and interests; stressing constructivist approaches to learning; and integrating the curriculum in order to improve society. Interdisciplinary approaches to the teaching and learning of mathematics create natural differentiation and enrichment opportunities for all students including the talented students (Sriraman & Dahl, 2007). In the age of globalization, societies have realized that there is an urgent need to move beyond the ego-centric needs of their particular society towards the shared needs of the planet. Numerous educational theorists have stressed the need for educational structures to stress co-operation, social and environmental justice and wisdom through schooling (Atkinson, 1994; Kurth-Schai, 1992; Sternberg, 1998, 2001).

The Greek philosopher, Socrates, said that our ultimate purpose is to will Good for humankind. If one accepts this premise and connects this to the purpose of contemporary education (and not only the discipline of mathematics), then it becomes clear that two broad goals of education must be:

(1) to produce citizenry who are capable of thinking critically and willing to engage in such thought; and

(2) to develop an awareness for the value of making reasoned choices that seek to will Good for humanity.

Critical thinking is often not associated with the teaching and learning of mathematics, however the two disciplines share many common traits. Historically, training in critical thinking makes explicit use of formal logic in order to draw inferences and/or make comparisons. Mathematics can be presented as being structured and rigid in the same way, but this need not be so. Plato in *Apology* suggested that one should not blindly accept a persuasive argument without being aware of the reasons why the argument is persuasive (Plato, 1999). In other words, a critical thinker must be able to examine the validity of the logic used in an otherwise eloquent and persuasive argument, as well as to verify the facts and assumptions that are involved. Likewise, students of mathematics can be taught to question the didactic claims of their teachers and can be taught to validate mathematical propositions based on their own emerging skills and frames of reference. For the ancient Greeks, critical thinking not only involved an examination of the eloquent words and actions of other people but also an examination of one's own thoughts and capabilities. The traditional constructs of critical thinking have been criticized as being "a narrow way of thinking, excessively centered on reasoning and argumentation" (Smith, 2001, p.349) which do not take into account imagination or intuition, and do not nurture the creative (generative) side of thinking (Walters, 1994). If we believe well-stated arguments based on the position of the author (ad hominem) or

the authority of the teacher, then we can easily be misled by charismatic voices and thus fail to question and think critically for ourselves. Another criticism about the traditional view of critical thinking is that the excessive focus on formal logic, rhetorical ploys, fallacies and argument construction encourages students to view critical thinking as merely an arduous mental exercise without any wide-ranging applicability (Adler, 1991; Baron, 1988; McPeck, 1984). Students may lack the confidence to challenge propaganda or advertising because they might feel the rigorous tools required to think critically are beyond their abilities. Likewise when mathematics is taught as formal algorithms, with learning restricted to successful computation without any requirement to apply this mathematics to the real world, then it weakens the growth of knowledge for students (Sriraman & Adrian, 2004). Students must learn not only to perform in the context of their own world, but to explain what they are doing and why it is important.

Given these criticisms of the traditional definitions of critical thinking, we adopt a modified view of critical thinking that is compatible with the expectations we generally hold for beginning students. We define critical thinking as "reasonable reflective thinking that is focused on deciding what to believe or do" (Ennis, 1991, p.6) with the added requirement that it be connected to real life. This pragmatic view enables students at very early stages to understand the cultural and instructional influences that ought to influence accepted thought (Bacon, 1902). The rationale for choosing this definition is that it requires that critical thinking skills apply to real world problems, brings to the forefront the issue of bias in critical thinking (Paul, 1990), and makes use of appropriate questioning to stimulate students' reflections on problems (Simpson, 1996).

Paolo Freire (1921-1997), the Brazilian educator and social reformist, came of humble backgrounds. His book *Pedagogy of the Oppressed* (Freire, 1998) is perhaps the most frequently cited Marxist-influenced work in educational literature. Freire (1998) addressed the power dynamics between the oppressed and the oppressors (including the dynamic between teacher and student), and that the way toward liberation is through political movements and political struggle, of which literacy is but one part. Thus his emphasis on *writing* the world, is beyond literacy. Clearly, literacy (i.e., reading the world) is also an integral and necessary part of this process. Freire's banking concept holds that students are knowledgeable beings with the intrinsic capacity of creating knowledge with the teacher, as opposed to being empty buckets of ignorance or simply "files" or automatons dependent on the teacher's absolute authority to learn and construct new knowledge. It is also important to note that Freire emphasized critical literacy as opposed to functional literacy. The Organization for Economic Co-Operation and Development (OECD, 2004) has attempted to promote mathematical literacy in numerous countries through international tests like the Program for International Student Assessment (PISA).

Freire (1998) suggested that pedagogical practices should support education for liberation and emphasized problem-posing pedagogies that strive "for the emergence of consciousness and critical intervention in reality" (p.62). Problem posing pedagogies

are necessary if the goal of education is to challenge inequities. Freire's writing suggests a pedagogy which promotes greater social awareness or a social consciousness appropriate for initiating major shifts in thinking. An outstanding example of this pedagogy in practice is Gutstein's (2006) work *Reading and Writing the World with Mathematics*. Gutstein's work also points out the obstacles to such a pedagogy within a school system, particularly institutional resistance from administration and other stake holders within a school district (Sriraman, 2007).

The present day tension between equity and excellence in the school system in the U.S is symptomatic of the deeper political problems polarizing politics and people in this society. While the Hamiltonian tradition stresses elitism and division of classes based on the "cognitive" capital possessed by people, the Jacksonian tradition suggests everyone is equal no matter what. Sternberg (1996) points out that there exists a forgotten third alternative to the polarizing positions characterizing education today, namely the Jeffersonian tradition whose essence is that "people are indeed all equal in terms of political and social rights and should have equal opportunities; but they do not necessarily avail themselves equally of these opportunities and hence do not get rewarded for what they accomplish, **given equal opportunity**, rather than what might have, should have or could have accomplished" (pp.262-263). The challenge facing society today (in the U.S and elsewhere) is to first create this equality in educational opportunity. This is a necessary first step in resolving the tension between equity and excellence.

REFERENCES

Adler, J.E. (1991). Critical thinking, a deflated defense. A critical study of John. E. McPeck's Teaching Critical Thinking: Dialogue and dialectic. *Informal Logic*, 13(2), 61-78.

Atkinson, D. (1994). A Tao for schools. *Interchange*, 25(2), 145-155.

Bacon, F. (1902). *Novum Organum* (1620). P.F. Collier & Son, New York.

Baron, J. (1988). *Thinking and deciding*. Cambridge, UK: Cambridge University Press.

Burton.L. (2004). *Mathematicians as Enquirers: Learning about Learning Mathematics*. Kluwer Academic Publishers.

Clark, B. (1997). Social ideologies and gifted education in today's schools. *Peabody Journal of Education*, 72 (3&4), 81-100.

D'Ambrosio, U. (1990). The role of mathematics education in building a democratic and just society. *For the Learning of Mathematics*, 10 (3), 20-23.

D'Ambrosio, U. (1994a). Cultural framing of mathematics teaching and learning. In R.Biehler et al. (Eds.) *Didactics of Mathematics as a Scientific Discipline* (pp. 443-455), Dordrecht, Kluwer Academic Publishers.

D'Ambrosio, U. (1994b). On environmental mathematics education. *Zentralblatt für Didaktik der Mathematik*, 94 (6), 171-174.

D'Ambrosio, U. (1998). Mathematics and peace: Our responsibilities. *Zentralblatt für*

Didaktik der Mathematik. 98 (3), 67-73.

D'Ambrosio, U. (1999). Literacy, Matheracy, and Technoracy: A Trivium for Today.*Mathematical Thinking and Learning*, 1 (2), 131-153.

D'Ambrosio, U. (2007). Peace, social justice and ethnomathematics. In B. Sriraman (Ed). *International Perspectives on Social Justice in Mathematics Education. The Montana Mathematics Enthusiast*, Monograph 1, pp. 25-34.

Ennis, R. (1991). Critical thinking: A streamlined conception. *Teaching Philosophy*, 14(1), 5-24.

Freire, P. (1998). *Pedagogy of freedom: ethics, democracy, and civic courage*. Lanham: Rowman & Littlefield Publishers.

Gutstein, E. (2006). *Reading and Writing the World with Mathematics: Toward a Pedagogy for Social Justice*. New York, Routledge.

Haynes, R.M., & Chalker, D.M. (1998). The making of a world-class elementary school. *Principal*, 77, 5-6, 8-9.

Herzig, A. H. (2002). Where have all the students gone? Participation of doctoral students in authentic mathematical activity as a necessary condition for persistence toward the Ph.D. *Educational Studies in Mathematics*, 50, 177-212.

Hodginkson, H. (1991). Reform versus reality. *Phi Delta Kappan*, 73, 8-16.

Kent, G.S., & Lawrence, B. (2002). Celebrating mediocrity? How schools shortchange gifted students. *Roeper Review*, 25 (1), 11-13.

Kim, K.E. (2005). Learning from each other: creativity in East Asian and American Education. *Creativity Research Journal*, 17(4), 337-347.

Kurth-Schai, R. (1992). Ecology and equity: Toward a rational re-enhancement of schools and society. *Educational Theory*, 42(1), 147-163.

Martinsen, O. (2003). Introduction: Special Issue on creativity. *Scandinavian Journal of Educational Research* ,47(3) 227-233.

McPeck, J. E. (1984). Stalking beasts, but swatting flies: The teaching of critical thinking. *Canadian Journal of Education*, 9(1), 28-44.

Moreno, L & Trigo, M.S. (2007, in press). Democratic access to powerful mathematics in a developing country. To appear in L. English (Ed). *Handbook of International Research in Mathematics Education (2nd Edition)*. Lawrence Erlbaum and Associates.

Organization for Economic Co-Operation and Development [OECD] (2004). *Problem Solving for Tomorrow's World – First Measures of Cross Curricular Competencies from PISA 2003*, http://www.pisa.oecd.org/dataoecd/25/12/34009000.pdf. Retrieved 29.09.2005.

Paul, R. (1990). *Critical Thinking: What Every Person Needs to Survive in a Rapidly Changing World*. Rohnert Park, CA: Center for Critical Thinking and Moral Critique.

Plato (1999). *Great Dialogues of Plato: Complete Texts of the Republic, Apology, Crito Phaido, Ion and Meno*, Vol. 1. Translated by W.H. Rouse. Mass Market Paperback.

Schoenfeld, A. (2004). The Math Wars. *Educational Policy*, 18(1), 253-286 .

Seymour, E. (1995). The loss of women from science, mathematics and engineering undergraduate majors: An explanatory account. *Science Education*, 79(4), 437-473.

Seymour, E., and Hewitt, N.M. (1997). *Talking about leaving: Why Undergraduates leave the Sciences*. Boulder, CO: Westview Press.

Skovsmose,O. (1997). Critical mathematics education: Some philosophical remarks. The Royal Danish School of Educational Studies, Copenhagen (Denmark). Dept. of Mathematics, Physics, Chemistry and Informatics).12 p.

Skovsmose,O. (2004) Mathematics: Insignificant? *Philosophy of Mathematics Education Journal*,no.18, 19 p.

Skovsmose, O. (2005). Kritisk matematikkundervisning - for fremtiden Tangenten. *Tidsskrift for Matematikkundervisning*,16(3) p. 4-11.

Simpson, A. (1996). Critical questions: Whose questions? *The Reading Teacher*, 50, 118-126.[EJ 540 595] ED436007 .

Smith, G.F. (2001). Towards a comprehensive account of effective thinking. *Interchange*, 32(4), 349-374.

Spring, J. (2006). Pedagogies of globalization. *Pedagogies: An International Journal*, 1(2), 105-122.

Sriraman, B. (2005). Major Book Review of L.V. Shavinina& M. Ferrari (Ed.) (2004). Beyond Knowledge: Extra Cognitive aspects of developing high ability. Lawrence Erlbaum & Associates. *Interchange: A Quarterly Review of Education,* 35(6), 455-460.

Sriraman, B. (2007). On the origins of social justice: Darwin, Freire, Marx and Vivekananda.In B. Sriraman (Ed). *International Perspectives on Social Justice in Mathematics Education. The Montana Mathematics Enthusiast,* Monograph 1, pp. 1-6.

Sriraman, B., & Adrian, H. (2004). The pedagogical value and the interdisciplinary nature of inductive processes in forming generalizations. *Interchange: A Quarterly Review of Education,*35(4) 407-422.

Sriraman, B., & Dahl, B., (2007). Interdisciplinary Ideas in Gifted Education. To appear in L.V. Shavinina (Editor). *The International Handbook of Giftedness*. Springer Science

Sriraman, B., & Steinthorsdottir, O. (2007a). Research into Practice: Implications of research on mathematics gifted education for the secondary curriculum. To appear in C. Callahan & J. Plucker (Editors) *What the Research Says: Encyclopedia on Research in Gifted Education*. Prufrock Press.

Sriraman, B., & Steinthorsdottir, O. (2007b). Critical Notice: Emancipatory and Social Justice Perspectives in Mathematics Education. *Interchange: A Quarterly Review of Education*, 38(2), 195-202.

Sriraman, B & Törner, G. (2007) Political Union/ Mathematics Education Disunion: Building Bridges in European Didactic Traditions. To appear in L. English (Editor) *Handbook of International Research in Mathematics Education (2nd Edition)*. Taylor and Francis.

Sternberg, R. (1996). Neither elitism nor egalitarianism: Gifted education as a third force in American Education, *Roeper Review*, 18(4), 261-263.

Sternberg, R. J. (1998). A balance theory of wisdom. *Review of General Psychology*, 2, 347-365.
Sternberg, R. J. (2001). Why schools should teach for wisdom: The balance theory of wisdom in educational settings. *Educational Psychologist*, 36(4), 227-245.

Walters, K.S. (1994). *Re-thinking reason: New perspectives in critical thinking*. Albany, NY: State University of New York Press.