The Theme of Individualism in Mathematics Education: an Examination of Mathematics Textbooks

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Mathematics textbooks often attempt to answer readily asked questions such as, "Why do you need to study mathematics?" and "What is mathematics used for anyway?" The answers most often given suggest that success depends heavily on developing quantitative skills and logical reasoning ability.

Introductions to math textbooks generally purport to enable individuals to develop the capacity to engage in logical thinking in order to read critically the technical information with which our contemporary society abounds. Textbooks state that individuals who study and learn mathematics concepts will acquire an ability for making sound judgements both in personal and political matters. Textbooks also claim to enlighten those who study mathematics about environmental and economic issues that dominate our modern life. The stated rationale for studying mathematics is that behind social issues are complex matters of science, technology, and mathematics. In this paper, I will put into question the value and mindset promoted by such claims. Most mathematics educators are likely to interpret the above textbook statements as positive. Accepting such claims uncritically promotes a view of the individual as free from history and culture.

Much has been written about mathematics textbooks, and texts in general, as representing certain political agendas (Spring, 1988)[1], as promoting a certain gender orientation (McBride, 1989)[2], as creating gender roles (Dowling, 1991)[3], and as promoting anthropocentrism (Bowers, 1993)[4]. I will argue that mathematics textbooks represent yet another political agenda: they suggest to students that they are autonomous, rational thinkers impervious to cultural influences. Stated differently, I will show how texts do not provide an explanation for understanding the interconnection of culture, language, and thought that is basic for thinking about ourselves as members of a larger community. I will examine chapters of two mathematics textbooks for the purpose of showing how mathematics curriculum might be understood as contributing to students' views of themselves as self-created individuals rather than of themselves as situated in a "community of memory."[5] To make my point, I will analyze how the mathematics curriculum works toward putting out of focus issues having to do with relationship.

First, I will discuss what I mean when I talk about the Cartesian idea of the self-constituted individual. Our culture views the individual as the basic social unit. Thus, typically culture, tradition, and language are not seen as central to our way of acting in our world. Within classrooms, teachers talk about individual empowerment and encourage all students to find their own voices. However, students (and teachers) are more deeply embedded in culture than is generally recognized. Such terms as "empowerment" and "mathematical power" currently are popular terms that have an accepted meaning within math education, but such terms also are embedded in a modern form of consciousness that insists that individuals transcend the ties of tradition or culture. Questions that arise here then are: In textbooks, what attention is given to discussion of meaningful and shared traditions? What attention is given to discussions of individuals' interconnection to an ecosystem? A problem that arises from perpetuating a Cartesian view of the autonomous individual, as I claim textbooks generally promote, is partly responsible for the ecological crisis.

In examining the textbooks, I will respond to the following questions in order to consider the constitution of students' roles in relation to the notion of autonomous individuals within the discourse of mathematics: What types of knowledge are represented as important, and what is the basis of authority taken for granted in math texts? What is the implied role assigned to mathematics and technology in math texts? What is the image of the individual, and how are relationships among people represented in math texts? I will discuss how in asking these questions the notion of individualism is addressed.

These questions have to do with cultural transmission in the classroom and are questions not typically asked in most teacher-education programs for mathematics teachers. Teacher training, as it is typically implemented, both preservice and in-service, is inconsistent with the above questions. Virtually no attention is paid to the study of mathematics as an epistemological system focusing on socio-cultural and historical dimensions of the discipline that remind us that we are tied to culture and to the past. According to C.A. Bowers, in *Education, cultural myths, and the ecological crisis: toward deep changes*: "neither the university nor professional education of most teachers provide an adequate basis for understanding the interconnection of culture, language, and consciousness—which, ironically, is at the heart of the educational process."[6] Understanding the connection of language to culture can provide a conceptual framework for individuals to see themselves as members of a community of memory.

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Within mathematics classrooms, math teachers work toward teaching students how to think rationally through the well-defined language of mathematics. How teachers and students think about such notions as success, individualism, community, mathematics, technology, and progress is critical to establishing any kind of a sense of community within the ecology of the math classroom. Authors of mathematics textbooks do not attend to the unexamined meaning implied in terms such as success, individualism, or community; rather, textbooks tell us that learning mathematics will provide us with what we need to know to make the right choices in our technologically oriented society. Unfortunately, teachers and students are not required or taught how to critique the language of mathematics to allow for alternative ways of viewing the learning of mathematics as situated within a sustainable community.

Mathematics educators recognize that math textbooks are necessary to teach particular skills and so do not view texts as contributing significantly to the socialization of students, a socialization that perpetuates individualism. However, textbooks are the underpinnings of most mathematics curriculum, and statements in mathematics textbooks claiming "math is a fundamental tool to study human behavior" or "a new profession is emerging devoted to thinking mathematically about human affairs" contribute to a sense of separation of humans from nature and each other. A question to ask is whether the intent of curriculum or textbooks is to instill an acultural skills-based curriculum into students that provides a framework for viewing the individual as the basic unit of knowing, or whether curriculum should be driven by relevant community issues that bring about an awareness that language encodes earlier forms of cultural knowledge.

The term "individualism" must be defined and explained here as it is being used in this paper. Scholars have addressed the notion of individualism since pre-modern times. According to Robert Bellah and his colleagues in *Habits of the heart,* our modern society believes in the myth of the sacredness of the individual."[7] The authors claim that our society views anything that would violate our right to think and judge for ourselves both personally and professionally as morally wrong. That is, we cling to the myth that the highest aspirations for our society and the world are linked to our individualism. Even the notion of success, defined in *Habits of the heart* as a conscious and calculated effort to acquire material betterment in our modern society, appears to be an outcome of the consistent work of the individual—individual achievement.[8] Individuals who are given the chance to be themselves learn early on to measure themselves and their autonomous quest for achievement against others' incomes and life styles. It is this definition of "individualism" on which I will rely in this paper. In much of our modern thinking, people share the notion that the individual takes precedence over the community. Bellah is challenging modern expressions of individualism, and he sees earlier forms of individualism, such as a view of civic individualism, still present in modern society, that warrant rethinking the role of the modern individual. According to Bellah and Bowers, cultural patterns that view the individual as autonomous have contributed to devaluing the importance of context, relationship, and a sense of community. I am not simply using the word "community" to refer to society but to the larger biotic community, a community within a situated context.

Like Bowers, Bellah and his colleagues claim that many of our most complex problems as a society are linked to our sense of individualism. These scholars point out a hidden dimension that has to do with our society's devaluing of tradition. That is, individuals are encouraged to rely on their own received authority in forming opinions—to think for themselves.

"Communities," in the sense that I use the term in this paper, have a history, and to speak of a real community is to speak of a "community of memory." In order for a community not to forget its history and traditions, it offers up examples of women and men who have embodied and who continue to embody the community. The key here is to recognize examples of the people of one's own community as exemplars. As stated in *Habits of the heart*:

> And if the community is completely honest, it will remember stories not only of suffering received but of suffering inflicted. . . The communities of memory that tie us to the past also turn us toward the future as communities of hope. They carry a context of meaning that can allow us to connect our aspirations for ourselves and those closest to us. . . [9]

For this paper, I selected two mathematics textbooks to analyze to discover their construction of individualism. The first was *For all practical purposes: Introduction to contemporary mathematics,* written by Lynn Steen [10]. The course taught using this textbook is designed for students who might take only one semester of math during their entire college career. The book covers topics such as management science, statistics, social choice, the geometry of size and shape, and mathematics for computer science. The second textbook I examined was *Algebra,* written and published by the University of Chicago School Mathematics Project.[11] This textbook was designed for use in a first-year algebra course and emphasizes such concepts as reading and problem solving, a reality orientation, use of technology, four dimensions of understanding (skills, properties, uses, representations), and an instructional format to maximize acquisition of skills. Both texts include anecdotes and pictures in an apparent effort to appeal to students. *Algebra* includes pictures of women, minorities, and even families working and living in what looks to be a cooperative manner. A perusal of both the textbooks suggests they are up to date with relevant information presented in a politically correct context.

These textbooks were selected because they are current and represent two rather different groups of high school or college students—one that will likely continue on with mathematical studies and one group that will study an overview of mathematics for just one term. Both textbooks characterize accepted pedagogy in their view of mathematics teaching and learning. I want to stress here that in examining these textbooks, I will not simply be consider-

ing the wording of problems so much as the culturally implicit messages and assumptions that frame the writing of these books that lead to how we come to understand mathematics learning

Analysis of textbooks

Basis of knowledge

As I asked earlier, what types of knowledge are represented as important in these textbooks, and what is the basis of authority taken for granted by the authors? In the book, *For all practical purposes,* an acknowledgment is made to students that many aspects involved in daily decision making are nonquantitative in nature and are related to history and morality. In one such discussion, for example, Steen asserts: "As a consequence one often refers to decision making as an art rather than as a science " But Steen goes on to suggest quite the opposite: "On the other hand, many ingredients in contemporary decision making are mathematical in nature....."[12] Clearly, the message presented to students in this text is that decision making is becoming dominated by mathematical thinking It also suggests that making decisions through a rational, mathematical process is superior to alternative ways of decision making For example, the following table is used in the textbook to elucidate how individuals arrive at good or equitable decisions. This table points out individuals' concerns in the left-hand column and refers students to the right-hand column for solutions that are based in mathematical theory, thus obscuring the community dimensions in which such concerns are based.[13] That is, students believe that as autonomous and rational individuals, relying solely on correct mathematical theory will bring about clarity of social issues.

A decision maker's concern		Related mathematical subjects
1	Identify and measure strategic variables	Theory of measurement
2	Understand a complex system	System analysis, graph theory
3	Quantify one's preferences	Utility theory
4	Formulate objectives and constraints	Mathematical programming
5	Acquire data and forecast results	Statistics
6	Determine the most efficient outcomes	Optimization theories
7	Deal with uncertainty	Probability theory
8	Resolve conflicts	Game theory
9.	Group decision mechanisms	Social choice theory
10	Equity considerations	Fair division theory
11	Make decisions using a multi-disciplinary approach; management science	Operations research
12	Make decisions in an institutional setting	Policy science

The claim is made that the related subject areas shown at the right have developed relatively recently in the context of mathematics as it applies to human actions When students and teachers alike learn to rely solely on mathematics for an answer or solution to a problem, a relationship of the rational process of the individual and mathematical principals is illuminated What gets put out of focus is the interconnection of the individual with cultural patterns of thought that contribute to relationships

Missing in this table and elsewhere in the textbook is that the mathematicians who create these fields of study are as bound to their culture and traditions as those who study this textbook. Failure to mention this strengthens the mindset in students that the theories listed in the above table represent high forms of knowledge created by autonomous and abstract thinkers Students thus learn to aspire toward such ways of viewing decision making, ways that insist on individualism over a sense of community. It is beyond the scope of this paper to discuss in any great detail the area of the sociology of knowledge that argues that the notion of objectivity (which equates with the mathematical knowledge represented in the table shown) itself is a social construct. This area of knowledge supports the claim that mathematical knowledge, as demonstrated in the above table, is laden with cultural values, values based on the needs of a community.[14]

The textbook, *For all practical purposes,* includes short installments throughout, referred to as *spotlights,* that give an extra amount of information to students about particular concepts being considered; an attempt at providing a historical context that could lead to a building up of a sense of community is made with these paragraphs. While the spotlights are entertaining and perhaps even interesting to many, only three of them in the entire text credit women as having contributed to mathematical knowledge, thus ignoring a large community The spotlights carry with them pictures of scientists and mathematicians, most of whom are men, thus, creating a particular domain of authority from which several students are excluded. What is hidden from students in these readings is a variety of important social and cultural issues imbedded in community. The source of authority for students becomes the men of mathematics who are viewed as experts; their abstract knowledge has greater authority than that accorded to those reading the text, or even the one teaching from the textbook. Students are socialized to believe that this received knowledge is a powerful and legitimate way of autonomous thinking; the best students undoubtedly will learn to make sense of their daily experiences through the rational process, a process characterized as an intellectual and individual activity. This intellectual activity is developed, as Bowers suggests, in that: "students must learn to think of themselves as the authors of their own choices, rationality, and behavior In effect, they must view their particular thought process as having the potential of freeing them from their embeddedness in culture."[15]

He goes on to say that students, just as the rational-thinking men who create mathematics, come to learn to confront information with their own minds for the purpose of making correct decisions that lead to objective solutions. In this way, students do not see themselves as members of a larger biotic community, rather what gets transmitted is a set of values that puts out of focus how students are interconnected to nature and the past.

Role of technology

What is the implied role assigned to mathematics and technology in math textbooks? The claim in *For all practical purposes* is that a revolution is taking place in which mathematics and computers are playing an increasingly important role in understanding our social institutions.[16] Thinking of mathematics and technology as a primary

means of understanding the self as the basis for understanding the world or of making sense of events in the world reflects a way of knowing that leaves out discussions of community or context. However, as math and technology increasingly become accepted as the underpinnings of our way of knowing, we are in danger of conceptualizing human affairs through a narrowly focused lens. This lens promotes a view of individualism that does not provide a means of sustaining the community of memory referred to in *Habits of the heart*.

Both textbooks show the interconnection of mathematics and technology and devote sections in chapters and examples to discussions of the importance of technology. Students are persuaded to appreciate the advances in our modern-day society through technology and come to view technology, along with mathematical skills, as a primary means for solving societal problems. Students are led to see individuals as autonomous who are rather removed from the problems or examples presented in the text. The following example from *Algebra* supports this point:

> Foresters in the Allegheny National Forest were asked to estimate the volume of timber in the black cherry trees in the forest. They had to do it without cutting all the black cherry trees down. They did cut down 20 trees of varying sizes. They measured the diameter of each tree and the volume (in cubic feet) of wood that the tree produced. Fit a line of data by eye. Is it a good fit? Find an equation for your line. Estimate the volume of a black cherry tree with diameter 15 inches.[17]

No mention is given in the textbook about why the volume of the black cherry trees had to be determined; however, the reader is persuaded by the problem of the need to measure the trees, a solution that involved cutting down the trees. Those solving the problem do not question the myth that the use of mathematics and technology are mere neutral tools to provide rational solutions to this societal problem. Cultural beliefs—such as the preservation of forests as critical to the preservation of communities—are not recognized, understood, or taken seriously when conceptually framed through the lens of mathematics and technology, and so are issues that are ignored in the textbook. The larger cultural message that is transmitted here is that correct social behavior is determined by considering only the technical rules that frame any situation.

Another statement taken from the book, *Algebra*, claims:

> Computer exercises present important representations of the language and algorithms of algebra. to help the student develop a sense of *when* (my italics) technology is appropriate, many lessons contain questions requiring mental computation.[18]

The textbook goes on in the homework exercises to explain *when* one should or should not use technology:

> Often it is quicker and more convenient to do problems in your head. Punching calculator keys for simple problems is time-consuming and may lead to careless mistakes.[19]

The directions continue to instruct the student not to use a calculator or pencil and paper and to work several exercises by mentally estimating answers. These are the only references made in the text to the appropriateness of the use of technology, and these statements clearly do not provide an opening framework to those using this textbook for thinking about the complex moral dimensions implicit in the use of technology. Cultural issues having to do with uses of technology as it relates to responsibility to one's community are not problems that can be seriously considered in the framework of mathematics and technology alone and so reference to such issues is left out of these textbooks.

Image of the Individual

What is the image of the individual, and how are relationships among people represented in math textbooks? In *Algebra*, an introductory note provided to the students suggests particular practices in which students can engage to guarantee success with their use of this text. The authors remind students to read slowly, to have the correct tools at hand, to work problems daily, and not to give up. While this is sound advice for studying any subject, the emphasis here is put directly on the individual achievement of students to learn mathematics on their own in order to deal with the mathematics they encounter in their daily lives. Also reinforced is the idea that learning mathematics promotes a particular way of thinking that encourages individuals who view themselves as autonomous individuals who are uninfluenced by the moral dictates of culture. Nowhere are students encouraged to think about the relevance of their studies for the purpose of eliciting from them an understanding of how they are tied to the past.

One underpinning message here is that students again must work alone, not in relationship with anyone, to develop speed in solving unrelated problems with no context of meaning. This way of learning does not allow for people to experience mathematical learning. That is, students continually deny their own sense of community, their own socialization, and their own experiences because these experiences or ways of knowing do not fit the formal knowledge framework set up in math classes.

Ironically, both math textbooks imply that mathematics is the study of patterns and relationships. But the term *relationship*, as used in these math textbooks, means something entirely different than common definitions of the term. Students are expected to have a relationship with mathematics textbooks and to see relationships between mathematical concepts through symbols and equations with very little context provided. Claims in the textbooks are made that mathematical sentences are considered to be powerful statements because they allow students to symbolize patterns and relationships in an efficient, organized fashion.[20] Efficiency and speed are key, then, in the notion of relationship. For example, the two problems that follow are taken from *Algebra*:

> Does a woman run an increased risk of heart disease if her waist and hip measurements are 32″ and 37″, respectively?[21]

> Does a man run an increased risk of heart disease if his waist is 34″ and his hips are 36″?[22]

These two examples can be worked quickly, and since they emphasize numerical information, they hide the complexity of community issues having to do with heart disease. These exercises promote the idea that if individuals have the correct information or data, then they will act morally. That is, students come to believe that if they possess precise answers, they will ultimately do what is right. However, merely calculating the correct answer to the problems above is not likely to lead them to change their behavior in order to prevent heart disease. Another example follows that fails to address socio-economic causes for students dropping out of high school:

> Clearwater High School expects a 14% decrease in enrollment next year. There are 1850 students enrolled this year. How many students will the school lose?[23]

As already stated, these examples illuminate the quantitative dimensions of societal issues while putting out of focus moral issues of importance in establishing a sense of community of memory. students, then, do not develop the confidence to make decisions about the kinds of mathematical knowledge they need to make choices in a way that takes into account their relationship to their community and environment.

Neither textbook seriously discusses or questions the notion of historical context as it relates to the discover of math concepts, that is, how we are tied to the past. Rather, to encourage efficiency and speed of learning, very little context is provided for the reader. When explanations are given they are brief, as the following example from *Algebra* shows:

> About 3500 years ago, and [sic] Egyptian wrote the hieroglyphics shown below. They tell how to find the area of a rectangle with length 10 units and width 2 units. Today's description in English can be shorter . . . We can shorten the English statement by using symbols for equals and times . . . This statement can be abbreviated still more by using variables.[24]

No context is provided in the above example in order to situate students in relation to their work. The notion of individualism is perpetuated here by focusing on efficiency, and what gets left out has to do with the non-numerical issues of their lives, this is, how they are interconnected to a larger community.

Similarly, the next few examples, taken from *Algebra*, do not address questions concerning the connection of humans to the earth or to each other.

> Suppose a farmer's topsoil is eroding at a rate of 0.5 inch per year. The rate of change is -0.5 inch/year. If erosion continues at this rate for 20 years, multiplying gives the total loss . . . The final answer is negative, which means that 10 inches of topsoil will be *lost* [book's emphasis] over the twenty years. This instance confirms the rules for multiplication of positive and negative numbers.[25]

In this example, no context is provided for students to understand how they are interconnected with their environment and the eco-crisis. The message here that promotes individualism is reinforced with the myth that students are removed from cultural patterns and, thus, do not come to appreciate a concern for the larger biotic community.

Two more examples follow having to do with population growth:

> If the growth rate of the 1980s continues, the U.S. population will double every 75 years. Since the U.S. population was 226.5 million in 1980, the number of people y (in millions) in the U.S. after x 75-year periods from 1980 is given by the formula $y = 226.5 \times 2^x$ . . . Estimate the value of x when the U.S. population is one billion. In what year is the U.S. population expected to be one billion?[26]

> The average 8th grader has a volume of about 3 cubic feet . . . Assume the population of the world to be 5 billion people. Is the volume of all the people more or less than the volume of a cubic mile? How much more or less? Assume the average volume of a person equals 4/3 the average volume of an eighth grader. (There are 5280^3 cubic feet in a cubic mile.)[27]

Clearly, these examples put out of focus concerns related to population growth. In the second example, population is equated with the volume of a cubic mile thus ignoring the larger problem of over-population and the depletion of natural resources. To work successfully, students need to solve these problems efficiently and not think about a context or relationship in which to apply their new-found skills. As I mentioned earlier, the role of students is to recognize mathematical relationships in the above statements merely as a means of solving the problems to check their knowledge of mathematical concepts. With regard to another dimension of thinking and decision making, these examples continue to reproduce patterns of individualism that do not create a conceptual framework that puts into focus notions of tradition or community. With such data, decisions about complex social problems get made on a very narrow, rational basis.

Even though students may know about certain mathematical concepts after working several exercises, they may not know how to explore interconnected issues such as their own relationship to the population explosion, or their relationship and responsibilities with regard to the population and the environment toward each other. In these textbooks, such discussion is not encouraged.

A question Bellah and his colleagues raise in *Habits of the heart* is whether a sense of individualism in which the self has become the main form of reality can be sustained. They go on to ask the question whether individuals need to be in relation to a larger whole, a community, and a tradition to nurture both themselves and the community. Too often, teachers cannot or do not bring about discussions of moral issues having to do with population growth or the environment in the context of mathematics and technology; they cannot articulate the complexity of such problems themselves because they have been come to believe that the application of mathematics theory and technology can and will solve all social problems.

A term that has been around for several years now is "ethnomathematics" which refers to an account of the study of the history of mathematics. Ethnomathematics

claims that learning mathematics has to do with individuals understanding their interconnection to their environment from which knowledge evolves. The dynamic of this interaction results in structured knowledge that students recognize and can be responsible to and for. A pedagogy that considers principles of ethnomathematics certainly could serve as a beginning for teaching mathematics education classes, as well as for teaching mathematics.

Educational implications

Neither students nor teachers walk into classrooms as blank slates. Rather, each brings to the classroom a set of preunderstandings from home and other cultural sources. The content of textbooks is not entirely responsible for perpetuating a consciousness that focuses on individualism as a source of empowerment. However, the function of the textbook does become that of reproducing a mindset so that students' understandings of what it is to be autonomous, self-creating individuals is reinforced in the discourse of the mathematics curriculum.

Mathematics teachers use textbooks in a variety of ways ranging from teaching directly from textbooks to supplementing lessons with information gathered from several books to challenging certain ideas or beliefs contained in math textbooks. In doing the latter, teachers can create an opening for focusing on the connection between language and the cultural patterns of mathematics. Bowers reinforces this claim by stating three characteristics of language that stand out as critically important for consideration of the content of textbooks in general:

> To summarize the essential points: (1) language is not a neutral conduit through which ideas are communicated to others, but plays a constitutive role in organizing the thought process itself; (2) just as language enables us to think about experience . . . the lack of language can leave areas of experience unreflected upon and unarticulated—that is, unrecognized; (3) the metaphorical nature of language involves . . . encoding a schema of understanding that, in turn, influences current thought processes [28]

Certainly, these three points apply to the selection of mathematics textbooks.

Mathematics textbooks have been written in such a way so that students are encouraged to view themselves as member of a community. *Relearning mathematics: a different Third R--Radical Maths,* by Marilyn Frankenstein[29], is an example of a classroom textbook that takes into account the three claims made above. This textbook draws upon experiences of students, their families, and their communities to create a rich environment that provides a common and local purpose to the math lessons. In this way, math is framed around socio-political issues which so often are ignored in the discourse of mathematics education. Frankenstein uses language in such a way that students begin to see that phrasing of examples illuminates certain mathematical concepts and completely hides larger socio-cultural issues of unemployment and racism.[30]

One underlying message in the two textbooks I examined is that to participate in or understand mathematics, students must come to view themselves as autonomous individuals. This view is reinforced with a pedagogy that uses examples which teach students to privilege the individual over the larger community. In Frankenstein's book, a discussion of mathematics brought about by the examples she chooses is developed that situates students in a context that allows for rethinking the study of mathematics as community based. In considering principles of ethnomathematics, Frankenstein succeeds in presenting mathematics to students in a way that does not ignore cultural patterns of thought that situate students within a community of memory.

Another recently published textbook that makes a serious attempt at discussing mathematics within various contexts is *A history of mathematics: an introduction* by Victor J. Katz [31]. One statement made in the textbook represents the textbook's concern for incorporating the contributions of all communities who have participated in the forming of mathematical ideas:

> [A]lthough for various reasons women have not participated in large numbers in mathematical research, biographies of several important female mathematicians are included. These are women who succeeded, usually against heavy odds, in contributing to the mathematical enterprise.[32]

I used this quote to point out the importance for students to see how modern mathematics is tied to the past contributions of women who have studies mathematics.

The text by Katz particularly focuses on non-Western cultures that have participated in the forming of mathematical theories, illustrating how mathematical ideas have developed simultaneously in various parts of the world. Again, the point is that many non-eurocentric cultures have contributed to theories of mathematics. The style of writing this text utilizes—the lengthy paragraphs discussing histories—undoubtedly creates an opening for discussions within the classroom having to do with how we are tied to past cultural patterns. This book, as well as *Relearning mathematics*, could serve as excellent sources for math teachers whose knowledge of the socio-political dimensions of mathematics is limited.

The incorporation of the social and cultural dimensions of mathematics into the mathematics curriculum is critical if educators are seriously committed to presenting mathematics in a way that considers a community of memory. The culture of many math classrooms, even at the university level, continues to be dominated by the view of individualism I have discussed. Only recently have math educators viewed as problematic the omission of ontological questions concerning the nature of mathematics and its relationship to the various communities to which it is tied. Mathematics can be understood fully only as a historical and social construct, and students need to understand the connection of math to values and experiences of the larger community. It is no easy task to commit to the idea that the learning of mathematical concepts needs to become part of a way of knowing that situates individuals within the context of communities of memory. As Bellah states, we are a society whose first language is that of modern individualism, and "the practices of separation that go with it, are so dominant that alternatives are hard to understand."[33]

Though research exists that claims that many mathematics teachers sense a problem concerning the teaching of mathematics, often teachers cannot frame the problem beyond this first language of modern individualism. After reading this paper, hopefully math educators will recognize their responsibility of providing exemplary methods of learning mathematics as framed through a cultural lens that views individuals as members of a community of memory.

Notes

[1] Joel Spring, *Conflict of interests: the politics of American education* (Longman, 1988)
[2] Maggie McBride, A Foucauldian analysis of mathematical discourse, *For the Learning of Mathematics*, 9, (February, 1989): 40-46
[3] Paul Dowling, Gender, class, and subjectivity in mathematics: a critique of Humpty Dumpty, *For the Learning of Mathematics*, 11, (February, 1991): 2-8
[4] C A. Bowers, *Education, cultural myths, and the econological crisis: toward deep changes* (SUNY Press, 1993)
[5] Robert Bellah, Richard Madsen, William M. Sullivan, Ann Swidler, Steve M. Tipton, *Habits of the heart: individualism and commitment in American life* (Harper and Row publishers, 1985)
[6] Bowers, 199
[7] Bellah, et al., 142
[8] Bellah, et al , 149
[9] Bellah, et al , 153
[10] Lynn Steen, ed , *For all practical purposes: introduction to contemporary mathematics*, 2nd ed , (W H Freeman, 1988)
[11] University of Chicago School Mathematics Project *Algebra*, (Scott, Foresman, 1990)
[12] Steen, 237
[13] Steen, 238
[14] Paul Ernest, *The philosophy of mathematics education: studies in mathematics education* (Falmer Press, 1991) 89-108 Richard Noss, Andrew Brown, Paul Dowling, Pat Drake, Mary Harris, Celia Hoyles, Stieg Mellin-Olsen, eds., *Political dimensions of mathematics education: action and critique* (Department of Mathematics, Statistics and Computing Institute of Education, University of London) 85-92
[15] Bowers, 149
[16] Steen, 237
[17] University of Chicago School Mathematics Project, 523
[18] University of Chicago School mathematics Project, v
[19] University of Chicago School Mathematics Project, 8
[20] University of Chicago School Mathematics Project, 4
[21] University of Chicago School Mathematics Project, 223
[22] University of Chicago School Mathematics Project, 223
[23] University of Chicago School Mathematics Project, 229
[24] University of Chicago School Mathematics Project, 3
[25] University of Chicago School Mathematics Project, 223
[26] University of Chicago School Mathematics Project, 441
[27] University of Chicago School Mathematics Project, 457
[28] Bowers, 221
[29] Marilyn Frankenstein, *Relearning mathematics: A different third R---radical maths* (Free Association, 1989)
[30] Frankenstein, 9
[31] Victor J. Katz, *A history of mathematics: An introduction* (HarperCollins College Publishers, 1993)
[32] Katz, xii
[33] Bellah, et al , 155

I think a far nobler seriousness (...) is achieved when—by applying dialectical art and choosing a fitting soul—one plants and sows words founded on knowledge, which are able to support themselves as well as him who planted them and which do not remain barren but contain seeds, whence they grow up again, differently in different persons and thus are able to perpetuate this seed undyingly.

Socrates in Plato's *Phaedrus*
