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M Is Not Just for STEM: How Myths about the Purposes of Mathematics Education Have Narrowed Mathematics Curricula in the United States

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Abstract: When public schooling was first introduced in the United States, early proponents emphasized the need for mathematics as critical for an informed citizenry in a democracy. Half a century later, this purpose of mathematics has been almost entirely overshadowed by the push for mathematics to maintain technological and economic advantages. The belief that preparation for technological careers is, and has historically been, the only purpose for school mathematics in the US has become a myth widely believed by the public and policymakers alike. As this myth took hold, mathematics curricula were narrowed, incorporating only the mathematics, and applications of mathematics, that supported this specific purpose. Not only does this narrowing of school mathematics negatively impact the development of informed citizens, but it limits the extent to which mathematics can be studied in ways that engage all learners. The emergence of mathematics for social justice is thus—in part—an attempt to recapture the broader purposes of school mathematics.

Keywords: constructivism; history of mathematics education; new math; mathematics for social justice

1. Introduction

Developments in the field of mathematics education since World War I have been jointly influenced by developments in educational research and political and economic needs. Mathematics educators have continuously confronted even the most basic premises of the field: what mathematics is important for whom and who decides; how people can effectively teach and learn mathematics; the relationship between school mathematics, democratic engagement, and ‘modern’ technology; and even the nature of mathematics itself. These questions have spurred healthy debates and less healthy “math wars” for the past century [1] (p. 77). As a result, the direction of the field of mathematics education has oscillated on several key questions including the role of technology in school mathematics, the purpose of school mathematics, and the relative importance of conceptual understanding and procedural fluency. Yet, political and economic forces, including public policies, parent groups, and perceived economic instabilities, have acted as dampeners on the field; allowing the field to come to consensus regarding questions about procedural fluency and conceptual understanding on the one hand, but limiting the accepted purposes for mathematics education on the other. These forces have sought to place additional emphasis on the technological and economic applications of mathematics to meet perceived social needs. Those advocating for this position have been quite successful; this success has allowed the field to come to consensus around the dual importance of conceptual understanding and procedural fluency. However, these changes have also borne the destructive myth that the purpose of school mathematics is solely or primarily to prepare students to engage in a technological world, a myth that has, consciously or not, been accepted

by many classroom teachers and others in the field at large. This myth limits the possibilities and opportunities for learning in school mathematics and ignores the role of mathematical literacy in successful democracies.

This paper situates various movements in mathematics education in historical context, and briefly describes the consequences of each movement for the field of mathematics education. It demonstrates that, while many reform movements within the field of mathematics education sought to respond to the changing social and economic needs of the US, the unintended consequence of many of these movements was to narrow the focus of mathematics to scientific and technological applications, at the expense of mathematics education as a means of assuring the ideals of democracy and informed civic engagement. Indeed, the purposes of school mathematics cited in both recent policy documents and political discourse now often assume that preparation for advanced technological careers is the only possible purpose of school mathematics; developing informed citizenry rarely, if ever, enters the public discourse around school mathematics in the US. Current work in critical mathematics and mathematics for social justice in the United States can therefore be viewed as refocusing on alternative purposes of school mathematics and re-engaging in important debates about what school mathematics should be.

2. First Principles of Mathematics Education in the 20th Century

After World War I, as the United States found itself in a newfound position of both military and economic power, more students began to seek educational opportunities beyond grade eight. At the onset of the Great Depression, this new wave of students became a flood as students sought more education so that they may have a better chance of employment [2,3]. Scholars and educators recognized that they needed to meet the abilities, interest, talents, and goals of a far wider range of students and considered the appropriateness and effectiveness of the mathematics curriculum for these students [2,4]. Given the unlikelihood, during the Great Depression, that all students would gain employment after schooling, the basic purpose of education (to gain skills for employment) was also being questioned. If students were not likely to gain employment, then, many argued, schooling should instill in students a “new system of values by which he may endow his personal life with worth” in ways that “harmonize with democratic ideals” [2] (pp. 7–8). Thus, they argued that the curriculum be built around the needs, talents, and interests of all students [2,3]. Yet, they did not simply consider the needs of the individual alone; given recent memories of the “Great War” and the looming threat of another world war, they sought to construct an educational system which would strengthen American democracy by ensuring that students developed analytical and communicative skills and understandings necessary to participate in democracy [2,3].

Alfred North Whitehead, among others, began to call for the end of “mediaeval traditions of learning” [5] (p. 83). He argued that problems in education stemmed from a system of education that viewed the minds of students as inert objects needing refinement and was full of inert ideas from which most students were alienated. Whitehead believed that schools needed to devise curricula that would engage the minds and interests of their students and aim to impart “an intimate sense for the power of ideas, for the beauty of ideas, and for the structure of ideas, together with a particular body of knowledge which has particular reference to the life of the being possessing it” [5] (p. 23). Likewise, John Dewey insisted that the curriculum follow the interests and needs of the child [6,7]. Based on these ideas, learner-centered theories, which argued that the aim of education should be to foster growth and prepare students to live personally fulfilling lives, emerged [8,9]. Educators were tasked with providing such rich experiences, monitoring students as they engaged in the experiences, and reflecting on the results in order to construct appropriate future experiences for the student [6].

Mathematics was seen as too difficult and uninteresting by leaders of some local school systems that adopted this view of education. Rather than changing the way mathematics was taught, many locally controlled school systems minimized or dropped mathematics from the curriculum. The mathematics curriculum that did survive, then, tended to be ‘traditional’ and rule-oriented [7]. However, local school systems instead sought to change the existing math curriculum and the purpose

of teaching and learning mathematics. These math educators rejected the notion that there should be different curricula offered to different students based on social class and insisted that “all pupils in the period of secondary education shall gain early a broad view of the whole field” before entering high school, so that even those students who did not continue to high school understood the basic principles of mathematics [10] (p. 3). This view reflected the broader values of the U.S.; fearful of popular socialistic, communistic, or fascist uprisings, the U.S. sought to embed liberal policies into the American system which would decrease the perceptions of inequity within the system and thereby minimize the risk of such uprisings [11]. For education, this meant making education more accessible to the masses, including women, who had won the right to vote in the US in 1920. Education was viewed as vital to ensuring both an informed citizenry and economic mobility. In particular, given the concurrent rise in the use of data and statistics in political discourse, mathematics was viewed as an imperative means to develop critical thinking skills necessary to critique such discourse.

As such, in high schools, mathematics educators felt that each student should be given “the most valuable mathematical training he is capable of receiving in those years, with little reference to courses which he may or may not have taken in succeeding years” or whether the student planned to continue on to college or not [10] (p. 14). They argued that the practical aims of school mathematics should be secondary to the mental training and development of skills necessary to the discipline of mathematics and the development of an appreciation for the beauty, power, and logic in mathematics and geometric objects [4,10]. By focusing on these aims, scholars hoped to avoid school mathematics becoming “a collection of isolated and unrelated details” and instead make mathematics more appealing to a broader range of students beyond the upper class male students who had historically been the primary, if not sole, beneficiaries of education [10] (p. 11). Thus, mathematics educators began exploring new means and methods of teaching. For example, Johann Pestalozzi developed an inductive method of teaching in which students were guided to formulate a ‘mathematical rule’ through guided examples and exercises, rather than the rule being given before exercises were attempted [7].

These innovations reflect some acceptance and spread of the student-centered learning philosophy advocated by Dewey and others. Yet, what impact student-centered learning had on classrooms is unclear. In 1943, at the height of World War II, the Army issued a report which clearly indicted the then-current system of school mathematics, stating that despite a large rise in the number of students studying algebra and geometry in high school, many men entering the army lacked the “basic understanding” needed in gunnery and requisition positions of the army [12] (pp. 245–246). As such, the Army recommended additional courses focused on “practical abilities” [12] (p. 250). As a consequence, many school local school systems returned to traditional methods of mathematics teaching and learning, emphasizing procedures and processes that would be required of military personnel. This was a critical moment in the history of mathematics education. It was the first call for school mathematics to be used to gain specific skills and procedures required by a specific profession; the military. This call fundamentally changed the way mathematics education was considered in the US as it shifted the purpose of mathematics education from that of improving one’s ability to reason to preparation for a future career.

It was at this point that a key myth about school mathematics began to develop; while these recommendations did not deny other possible purposes of school mathematics, they did emphasize future career preparation as the primary concern of school mathematics. Over several decades, the focus on career preparation in school mathematics would become so prevalent and pervasive that other purposes of school mathematics would disappear from policy papers and public debate about school mathematics. Ironically, in seeking to preserve and further American democracy, many in the field of mathematics education abandoned the methods which were developed specifically for those purposes in favor of more procedurally focused methods that required much memorization and little critical thinking.

3. A 'New' Mathematics of the Cold War Era

As World War II ended and the space race began, policymakers again demanded changes in the field of mathematics education in order to meet the needs of specific career fields. In particular, policymakers called for an increase in mathematically and scientifically able workers in order to compete technologically with the Soviet Union, and deemed American students deficient in this regard [7,13,14]. Scholars and educators called for “adequate training in mathematics for *all* students in our schools—each according to his needs.” [15] (p. 226). These efforts became known as the ‘new math’ movement and were focused on developing the problem-solving skills of students to allow the United States to continue innovating and maintaining its technological advantage [7]. Among the recommendations of the Commission on Post-War Plans were mathematical literacy for all, differentiation of students without stigmatization, improved elementary level mathematics teaching, and secondary level courses that focused on skills needed for technological purposes [15].

Technological advances also prompted mathematics educators and researchers to question commonly held beliefs about the nature of mathematics. Researchers felt that new technologies, like computers and handheld calculators, diminished the importance of computational skills; “the popular notion of mathematics as a science of computation is a misconception based on outdated curricula emphasizing drill methods” [14] (pp. 7–9). They argued for dramatic curriculum changes so that mathematics was viewed as a dynamic and evolving subject and its influence on the development of technology was more widely recognized and understood [16]. In other words, New Math proponents used emergent technology as a means to argue against the procedurally based mathematics programs that emerged during World War II and instead focus on conceptual understanding. However, in doing so, they implicitly accepted the premise that the purpose of mathematics education was primarily to train future scientists and engineers; that is, those career fields most likely to use the emerging technologies of the time.

Many adopted Bruner’s perspective that children are active problem-solvers who learn best when directly involved in difficult problems which interest them [17]. Given these views, mathematics educators rejected notions of repetition and drill as sound educational practices in mathematics: “Pages of drill sums and repetitious ‘real-life’ problems have less than no merit; they impede the learning process” [18] (p. 8). Instead, they advocated initially engaging students with mathematics informally, guiding students to form their own conclusions, rules, and theorems about the mathematics they were learning, and then introducing the formalized language and processes that were brought forth by the student [18]. While these efforts refocused mathematics education on problem solving, it did so at the expense of narrowing mathematics curriculum; because of emerging technologies and the perceived need for technological advantage, mathematics educators turned towards technological applications of problem solving and placed less emphasis on the extent to which tasks in mathematics classes “harmonize with democratic ideals” as envisioned after World War I [2] (p. 8). In other words, the myth that the sole possible purpose of school mathematics was preparation for technological careers grew as an unintended consequence of the New Math policies.

The impacts of these policies in classrooms was not clear. The National Advisory Committee on Mathematics Education (NACOME) analyzed enrollment and achievement data from 1960 to 1972 and concluded that ‘new math’ resulted in increased enrollment in math courses, especially among minority students, but very little change in student achievement [19]. In the end, the ‘new math’ movement was relatively short-lived and was considered by many policymakers and the public to be a failed attempt at reform [7,13,20].

4. Traditionalists Strike Back: The Back to Basics Movement

In 1973, Morris Kline published *Why Johnny Can’t Add: The Failure of New Math* [21]. Kline claimed that ‘new math’ left students without the basic computational proficiency needed for many technological careers, again implying that career readiness was the only purpose of mathematics education [3]. He also stated, erroneously, that the intended purpose of the new math movement was

to introduce students to mathematics created after 1700 (i.e., new math) at younger grades in order to increase their interest in the subject and argued that new math left students with weak foundations in arithmetic and other 'basic' math skills which would be more useful to the majority of students who would "enter into the full variety of professions, businesses, technical jobs, and trades or become primarily wives and mothers." [21] (p. 17). Never in Kline's book did he consider mathematical concepts or skills that would aid students as they attempted to understand and evaluate social policies or election promise; nowhere were the social applications of mathematics discussed.

Like NACOME, Kline pointed to declining test scores as evidence of his claims [21]. However, NACOME disagreed with Kline's assessment of the causes of these declines, and instead attributed the lack of achievement to the variety of approaches grouped under the moniker new math as well as an uneven implementation of the recommendations of new math across schools and locally-controlled school systems [19]. A closer examination of the testing data, however, reveals a third explanation: the testing data of the new math era included a wider variety of students, a significant portion of which had previously been excluded from testing data because they did not take the courses in which the assessments were given or participate in college entrance exams, from which most of the data were gathered [13].

Regardless of the reasons behind the testing data evidence, by the mid-1970s, public opinion had turned against the new math movement. Mathematics curriculum, in large part, returned to what it had been before the new math era [22]. Instead of utilizing new technologies to explore mathematical ideas, paper and pencil skills and drills, which were never left entirely behind, became a bigger part of mathematics classrooms across the nation, particularly in elementary classrooms [13].

By the early 1980s, results of these tests indicated a rise in the number of students meeting minimal standards, especially among minority and socioeconomically disadvantaged students, but a decline in the number of students who developed significant problem-solving or other higher-level mathematics skills [13,22,23]. Additionally, mathematics enrollments in high school dropped, and there were significant drops in the percentages of U.S. students pursuing what would now be called STEM majors and professions [22]. As such, the back to basics movement was quickly criticized as a narrowing of the curriculum to include *only* basic skills; indeed, this movement seemed to have failed to provide the majority of US students with either the technological skills deemed to be required for career readiness or the social-analytical skills once thought necessary for a healthy democracy.

Among the reports and papers criticizing the back to basics movements were *An Agenda for Action* and the *Priorities in School Mathematics (PRISM)* report, which collectively represented the National Council of Teachers of Mathematics' (NCTM) first major attempt to advocate for specific policies. The PRISM report offered statistical evidence as to what instructional practices were being utilized in classrooms and what recommendations made by *An Agenda for Action* were supported by classroom teachers [24,25]. These reports advocated several positions, including increased use of calculators, computers, and other technology in the mathematics classroom [7,19,24,25]. Of particular importance, however, was the need to develop students' higher order thinking skills and problem-solving skills [22,24–26]. Mathematics education proponents argued that the aim of mathematics education was for students to develop "an attitude to mathematics and an awareness of its power to communicate and explain which will result in mathematics being used wherever it can illuminate or make more precise an argument or enable the results of an investigation to be presented in a way which will assist clarity and understanding" (emphasis added) [27] (p. 96). In other words, this marked the first attempts of NCTM to advocate for policies that included language broadening of the purposes of mathematics education, though NCTM failed to explicitly discuss the multifaceted purposes of school mathematics. With no direct discussion of other possible purposes of school mathematics, this call went largely unnoticed, and the myth that technological preparation was the sole purpose of school mathematics continued to go unchecked.

5. The Math Wars

Others shared NCTM's concern about the direction mathematics education was taking, but did not agree with NCTM's assessment of needs. Many parents and policymakers continued to advocate for the 'traditional' models of mathematics curriculum [22]. A slew of reports, prompted by falling test scores on international and college entrance exams and a perceived weakening of the economic power of the US due to the rising economies in Japan and other Asian countries, were released throughout the 1980s and into the early 1990s [7,22,23]. A *Nation at Risk* (1983) had, perhaps, the most profound impact on schooling of any reform document to date. It garnered public attention due to sensational claims like "the educational foundations of our society are presently being eroded by a rising tide of mediocrity that threatens our very future as a Nation and a people" and "we have squandered the gains in student achievement made in the wake of the Sputnik challenge" and statistical testing data that were used to argue that the United States was "falling behind" other industrial nations [28] (p. 5).

Given the backlash of the new math era and a growing public distrust of federally supported curricula, the National Science Foundation initially failed to support the development of new curriculum materials that would align with constructivist perspectives of teaching and learning [22]. Instead, NCTM formed the Commission on Standards for School Mathematics and gave the commission two tasks: to define what it meant to be mathematically literate and to create standards for both mathematics curriculum and evaluation [22,29]. Those given this charge, many of whom were cognizant of, but disagreed with the public perception of the state of mathematics education, made efforts to appease the public and policymakers. They attempted to redefine the meaning of computational skills to include the understanding of what computations to perform, and the ability to assess reasonableness of answers when technology was used for computational purposes. This reconceptualization of basics skills made room for researchers and teachers to incorporate new ideas of constructivism into mathematics classrooms while advocating for 'computational skills' [30]. The resulting document, *Curriculum and Evaluation Standards for School Mathematics*, promoted 'mathematics for all'—the intention of which was to empower all students with skills and abilities that would enable them to be active, engaged, and critical members of democratic society [8,22]. After decades of narrowing the focus of school mathematics to preparing students for technological careers, these documents were the first to push back against the limited view of school mathematics and insist on a broader conceptualization.

Mathematics education researchers answered the call for methods to promote mathematical literacy and began to research methods meant to develop students' abilities to "think mathematically" [22] (p. 262). Social constructivists began to advocate for much more extensive communication and discourse in mathematics classrooms and supported instructional methods that allowed children to construct their own methods of solving mathematical problems [31,32].

Curriculum materials that resulted from these efforts differed greatly from traditional mathematics text books; they appeared less linear and had significant emphasis on discussion and group work, features which were not familiar to those used in traditional mathematics classrooms [22,33]. To many parents, professional mathematicians, and policymakers, standards-based curricula were reminiscent of the new math movement. By the mid-1990s, many antireform groups were created. In California especially, these groups were organized and politically savvy; they began an anti-standards campaign that described standards-based curriculum as "fuzzy" and devoid of "real" mathematics; by 2000, the California math wars had spread nationwide [22]. The use of terms like "fuzzy" were meant to directly attack mathematics which was not procedurally focused or focused on scientific or technological applications; in other words, these groups sought, largely successfully, to reinforce the myth that the sole purpose of school mathematics is preparation for technical careers.

6. Finding Common Ground

Differing views about the purposes and processes of mathematics education across the United States became a growing concern for the public at large around the turn of the 21st century. At the

same time, concerns about the economic competitiveness of the United States were also growing. Janet Napolitano, in her role as Chair of the 2006–2007 National Governor’s Association, wrote a report which argued that the United States could not continue to compete economically without an internationally competitive educational system [34,35]. This document became the catalyst for the move towards a common curriculum for English language arts and mathematics across the United States that resulted in the creation of the Common Core State Standards [36]. For mathematics, the mission of these standards was to reflect “the knowledge and skills that our young people need for success in college and careers. With American students fully prepared for the future, our communities will be best positioned to compete successfully in the global economy” [36]. This language ignored NCTM’s calls to develop mathematics curricula focused on critical citizenry and again narrowed the purposes of mathematics to college and career readiness for fields deemed critical for American economic success.

The brevity of the mission of the Common Core State Standards for mathematics represents the culmination of 100 years of narrowing expectations for school mathematics. This narrowing of purposes, if not intentional, has been largely overlooked by the field of mathematics education. For decades, the primary focus has been resolving the tension between computational proficiency and conceptual understanding. Coalescing around the idea that both are necessary for technological and economic advantage has allowed the field to come to consensus around the idea that mathematical needs have evolved to require greater amounts of conceptual understanding while diminishing the need for computational proficiency. In addition, a mounting base of research has demonstrated that students learn mathematics most effectively when the focus is conceptual first, followed by opportunities for practice to build computational proficiency [1]. This approach captures the beliefs of a large “middle ground” of educators and researchers who believe in a more balanced approach than the advocates of either extreme [22]. Yet, the mission of the Common Core State Standards blindly accepts the purpose of school mathematics as college and career readiness, with no discussion of other potential purposes. The myth of the purpose of school mathematics is thus cemented in US public discourse; there is not thought or question given to other potential purposes of school mathematics beyond preparation for future technical careers.

7. Gains and Losses in Mathematics Curricula in the U.S.

Coming to consensus about computational proficiency and conceptual understanding around the needs of technology has not been without cost. No longer is school mathematics widely recognized as necessary for informed citizenry and the continuation of democratic ideals; now mathematics is valued almost solely for its ability to create technological and economical global advantages. In 1923, the National Committee on Mathematical Requirements stated that the purpose of mathematics education should be to develop “an insight into and control over our environment and an appreciation of the progress of the civilization in its various aspects, and to develop those habits of thought and of action which will make these powers effective in the life of the individual” [10] (pp. 10–11). The 1938 Report of the Committee on the Function of Mathematics in General Education reemphasized this purpose, adding that mathematics should address personal living, immediate personal-social relationships, social-civic relationships, and economic relationships [2]. While it can be argued that these stated purposes include preparing students to meet technological and economic demands, these demands are clearly not the prominent concerns of mathematics education at this time. Indeed, it was not until 1940 that the increasing importance of mathematics in the sciences and economics was addressed in governing mathematics education documents [4]. Even then, the document gives the first general aim of mathematics education as a “successful democracy” [4] (p. 14). However, after the space race, technological and economic concerns took on increased importance in governing documents for mathematics education. By the time *A Nation at Risk* was written, these concerns were the central focus of mathematics education; the first seven pages are devoted to identifying the ‘risks’ of being unprepared economically and technologically, and only two paragraphs touch on the discussion of the

need for an educated electorate in a democracy [28]. This mirrors much of social policy in the United States in the last century, which has increasingly been couched in language about maintaining and gaining technological and economic advantages in the international system.

However intended, public policy and discourse about mathematics education in the US has largely accepted the myth that preparation for technological careers is, and always has been, the only possible purpose for school mathematics. While, clearly, this is one possible purpose, it is also clear that, historically, other purposes of school mathematics were not only considered but accepted and used to structure mathematics curricula. Yet, the myth is so accepted within the United States that any discussion of other purposes is often dismissed or met with disdain. While the problems of fake news and external interference in elections in the U.S. has caused policymakers and the public to question the role of literacy and social studies education in preparing students to grapple with such issues, mathematics education is not considered in public debates confronting these problems.

Mathematics education can and, historically, has played an important role in assuring an informed citizenry capable of critiquing complex political debates. Consider, for example, Figure 1a,b below.

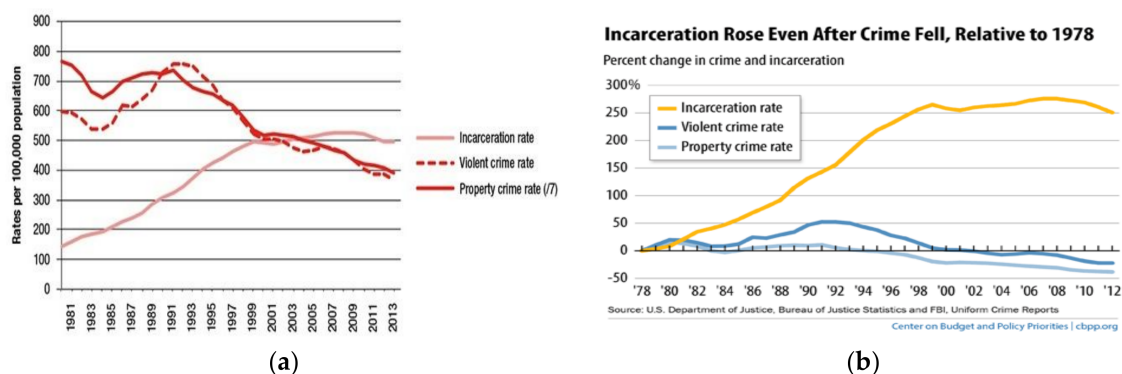


Figure 1. (a) Incarceration and crime rates 1980–2013 [37]. (b) Incarceration rose even after crime fell, relative to 1978 [38].

Each figure purports to provide mathematical information about the incarceration rate, violent crime rate, and property crime rate over similar periods of time. Both have also been widely available and viewed online in the last several years as criminal justice reform becomes a more predominant issue in the national debate. Yet, without the ability to apply mathematical skills to social issues, viewers of these two graphs might make widely different and possibly incorrect conclusions about these very important issues. However, the two graphs can serve as a foundation for several lessons on data, statistics, graphing, and mathematical representations. Students can be encouraged to collect, display, compare, and contrast data about social issues which interest them and critique the mathematical arguments made by policymakers and pundits. These mathematical skills will not only interest students, but will be useful to each student, regardless of their future profession. Thus, mathematical literacy remains a vital component of mathematics education, without which the American experiment in democracy will fail. We therefore must dispel the myth that mathematics is and has been primary or solely useful in technological and scientific contexts and recapture the social purposes of mathematics education.

Further, the belief that mathematics must directly apply to future endeavors is, itself, a myth. Mathematics, at its core, is a creative and innovative field. Engaging students in creative mathematics is a worthy use of school time. By constructing their own understandings of mathematics and connecting those understandings, students are empowered and develop creativity and agency that can improve their lives regardless of the endeavors they choose to pursue in the future. Thus, students who develop mathematical creativity “are willing to take intellectual risks and to challenge conventional beliefs”, which improves not just their academic lives, but their daily lives as well [39] (p. 977).

8. Return of Mathematics for Democracy?

While standards documents, policies, and public debate continue to focus myopically on technological and economic applications of mathematics, a growing number of mathematics education researchers and mathematics teachers are returning focus to mathematics education as a means of furthering the ideals of democracy. Researchers have been investigating the sociocultural and sociopolitical structures of mathematics education and calling into question what is included and excluded in mathematics curriculum. For a growing number of researchers, the purpose of mathematics education is to “see the humanity behind the numbers and to use mathematics as a tool for exposing and analyzing injustices in society and as a means for convincing others of a particular (often non-dominant) point of view.” [40] (p. 41). These avenues of research are clearly linked with concerns about access and equity; there has been a recent “surge in themes and number of sessions devoted to understanding and promoting increased participation and achievement in students who historically have been marginalized by the school system” at mathematics education conferences and an increased interest in “achievement gaps” in public media [40] (p. 38). Yet, the very fact that mathematics for social justice is assigned separate themes and sessions at conferences speaks to the continued “otherness” of this perspective of school mathematics. In other words, looking at themes of structural inequities and social justice is no longer viewed as an integral facet of school mathematics, even by the mathematics education community. In addition, several researchers promoting such theses have been subjected to backlash from the public and, sometimes, personal harassment [41].

9. Conclusions

While critical and creative mathematics and mathematics for social justice are often viewed as emerging research areas, they are, in fact, attempts to reemphasize the purposes of mathematics education that have been minimized or lost throughout a century of ‘math wars’. This requires dispelling the myth that preparation for technological careers is the sole possible purpose of school mathematics. Reframing these efforts as such may strengthen arguments for both the importance of, and need for such research in mathematics education; these efforts are, in fact, attempts to reclaim the full field of school mathematics, which is in danger of being lost to unsubstantiated myths about the role of mathematics in society.

In addition, overlooking creative mathematical and social issues as a source of interesting problems for students effectively places a stranglehold on mathematics teachers’ ability to engage their students. Students are naturally curious and creative mathematics allows students to engage in uniquely puzzling questions. In addition, students are social beings; social and political contexts are inherently interesting to all students because all students are living and will be working within the confines of these contexts. Certainly, the need to be technologically competent is increasing at a rapid rate; yet at the same time, technologies being developed take user friendliness seriously; the skills needed to use technology are a small fraction of those needed to create those technologies. Most students will be users but not creators of future technology. Thus, the premise that technological-mathematical skills will be necessary for students to succeed in society is yet another myth for all but a small minority of students who will enter STEM careers. What is clear is that all students will need mathematical abilities to create, to innovate, and to confront the increasing amounts of data and statistics about social and political realities to which they will be exposed on daily basis.

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