

Excellence and Equity in Mathematics Classrooms*

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Were John Dewey still alive, he would probably look at the present arguments about excellence and equity in education as reflections of a false dichotomy. Just as he reconstructed the relationships between interest and effort and between the child and the curriculum, he would help us see the relationship between excellence and equity in a new light.

In this article, we will not do what Dewey would have done because we are still struggling with ideas of excellence and equity. Instead, we would like to express our concerns about achieving equity, especially at a time when *excellence* has become a rallying cry for people inside and outside the field of education. The main point of this article is that even if the goal of equity is seen as crucial and threatened by the "excellence movement" in education, the most difficult problem is to determine exactly what constitutes equitable treatment of students in schools and classrooms. Given that most, if not all, teachers would agree that their interactions with students should reflect fairness and justice (i.e., equity), what can they do to ensure that equity exists in their classrooms? The example of a seventh-grade mathematics classroom will be used to show how difficult this task is.

The relationship between excellence and equity

The excellence movement in education has come to focus not just on students' level of achievement but also on what subject matter they are studying. One way to critique this movement and to argue for the importance of equity would be to focus on what subject matter is considered valuable by those who are calling for excellence in education. Although a discussion of high status and low status knowledge is necessary, our discussion of the relationship between excellence and equity begins with the assumption that knowledge of mathematics is important for everyone. In order to participate fully in our democratic processes and to be unrestricted in career choice and advancement, individuals must be able to understand and apply mathematical ideas. Therefore, although mathematics educators do need to examine their assumptions about the importance of mathematics, we begin this paper with the belief that all people should know about and be able to do mathematics.

Originally we wanted to argue not just that excellence and equity are compatible, but that true excellence cannot be achieved without equity. To make this argument, however, the basic meaning of *excellence* has to be changed. As long as *excel* means to surpass, to be superior to, or to outdo others, it would be difficult to argue that fairness, or justice, or equity is a necessary condition for excellence. One could, of course, try to argue for basing excellence on outdoing oneself, or surpassing some criterion, so that all of us can be excellent. But outdoing oneself is a problematic concept, and recent calls for excellence in education do not seem to be based on the goal of all people surpassing some criterion. Instead, competition with others is central to the excellence movement, whether the "others" are the Soviets, the Japanese, students in another state, or even one's own classmates.

Although not all forms of competition in our society are necessarily bad, there is reason to worry about the role of competition in our system of education in general and in classrooms in particular. When we look into classrooms, it becomes clear that striving for excellence operationalized as competing against and attempting to be superior to others can seriously threaten our quest for equity. Research on sex-related differences in mathematics performance provides at least some evidence that we have reason to be concerned. The work of Elizabeth Fennema and Penelope Peterson [Peterson & Fennema, 1985] indicates that certain students, particularly girls, do better in cooperative learning environments than in competitive ones. The problem, of course, is that most mathematics classrooms are already competitive in nature, thus inhibiting the performance of those students who would benefit from a more cooperative environment. And the danger associated with the excellence movement lies in the fact that it will reinforce rather than change many of the taken-for-granted realities of classroom life, whereas a focus on equity would lead us to ask how we might change classrooms to make them more fair and more just for all students. The *Nation at Risk* report [United States Department of Education, 1983], if not the beginning at least the creed of the excellence movement, tells us that Americans all have the same goals for our education system, that we need simply to carry out what we know is the right thing to do. A concern for equity.

on the other hand, would make us constantly ask: What is the right thing to do in our schools?

Striving for excellence is, then, empty at best and harmful at worst without a concomitant concern for equity. Equity, however, is a much more difficult goal to achieve than is excellence. It is easier to show that certain students have done better than others than it is to show that all students have been treated fairly. That is why lipservice to equity as we strive for excellence is simply not enough. And that is why teachers have such a profoundly difficult task in trying to address the goals of both excellence and equity.

Life in a seventh-grade mathematics class

We spent 45 days studying a seventh-grade mathematics class [Stanic & Reyes, 1986] and will use the example of this class to show that even when it is agreed that equity is a worthwhile goal, the most difficult problem is to determine what, in fact, constitutes equitable treatment of students. The class we studied was part of a coeducational middle school with a student population including black students and white students from a variety of socioeconomic status levels. The class was taught by a black male teacher, whom we shall call Mr. Martin. There were 17 students in the class, including 5 black females, 3 black males, 5 white females, and 4 white males. We took field notes and made audio recordings of the 45 class sessions, systematically coded teacher-student interactions, gathered artifacts during the classroom observations, studied permanent school records, administered student attitude questionnaires, and conducted interviews with the teacher and with each student. Both of us observed almost all the class sessions; we were not regular participants in daily activities but did on occasion interact with Mr. Martin and his students.

Seventh grade was chosen because we are generally interested in differential achievement in mathematics and it is at that grade level that significant differences in performance between boys and girls begin to appear. The specific results of this case study cannot be generalized to all teachers and students. But we believe that the struggles Mr. Martin went through (if not his specific responses to them) are struggles all teachers go through. He did not define and describe his interactions with students using the terms *excellence* and *equity*, but these ideas permeated what he intended to do with his students and what he actually did.

Equity has been the major focus of the research that has been done on race- and sex-related differences in mathematics [see Reyes & Stanic, in press, for a review of this research]. The specific goal of much of this research has been to describe the different ways in which teachers deal with various students. The assumption is that if we could eliminate these differences in how students are treated by making teachers aware of their actions, we would also go a long way toward eliminating the race- and sex-related differences in mathematics. But there are problems with this point of view.

The first problem is based on the fact that teachers are *taught* to treat students differently. A basic tenet of teaching is that one must adjust instruction to the individual needs and characteristics of students. It is also a normal

part of human discourse to interact differently with different people. Learning how to intentionally treat people differently is, then, a part of learning how to be a teacher and learning how to communicate with other human beings. So there are times when treating students differently is inappropriate, but it is perfectly normal that a teacher would not deal with all students in exactly the same way. Differential treatment is inappropriate only if it leads to individual students or groups of students achieving below their potential.

A second problem with previous research on sex- and race-related differences in mathematics is that differential treatment accounts for only part of what is happening. Even when we treat students in exactly the same way, different outcomes may result. That is, two students may respond very differently to the same treatment by the teacher. Teachers, therefore, are faced with a complex task: on the one hand, they must avoid inappropriate differential treatment; on the other hand, they must adjust to those individual differences of students relevant to the learning process. Put another way: it is not easy to treat students in an equitable manner.

The discussion of Mr. Martin's class is divided into two parts, the first part focusing on the consequences of Mr. Martin's differential treatment of students and the second on the consequences when students received equal treatment from Mr. Martin.

Differential treatment

One of the first things we focused on during our observations was how Mr. Martin treated individual students and groups of students differently. For example, Tim, one of the white male students, received a great deal of positive attention from Mr. Martin. Tim was often at the center of classroom interaction. When the class went over assignments, Tim consistently was called on for answers and called out his evaluations of answers given by other students. Although the other students expressed annoyance with Tim's behavior, Mr. Martin never reprimanded Tim for interrupting other students with his evaluative comments. Mr. Martin did on occasion reprimand Tim for goofing off with Bob, the white male student with whom Tim often interacted, or for packing up too early near the end of the period; however, the reprimand was always given with a smile or a laugh. In fact, just the mention of Tim's name made Mr. Martin laugh affectionately. Near the end of our last interview with Mr. Martin, he even referred to the class as "Tim's class". When the class had difficulty with a mathematics problem and Mr. Martin wanted a member of the class to explain how to do it, he most often looked to Tim for an explanation. In many ways, Tim was a living "teacher's guide" for Mr. Martin.

Katrina, a black female student in the class, also received much positive attention from Mr. Martin, but of a different sort. Mr. Martin laughed and joked with Tim, and the topic of most of their interactions was mathematics. He also laughed and joked with Katrina; however, their interactions were often about non-mathematical topics. For example, Mr. Martin and Katrina talked about his work as

a free-lance photographer. He often shared anecdotes of his personal, out-of-school activities with Katrina, but he almost never did so with Tim. Katrina and Mr. Martin did interact about mathematics, but most of this was a result of Katrina asking for help, which she did more often than anyone else in the class. There were contradictions in Katrina's behavior. On the one hand, as leader and member of a group of four black female students, Katrina was both independent and assertive. On the other hand, as a learner of mathematics, she was very dependent on Mr. Martin and rarely worked on her own longer than five minutes without asking him a question about the assignment. Tim, unlike Katrina, rarely asked Mr. Martin a question about mathematics or anything else.

Henry, a black male student, not only received less attention from Mr. Martin than either Tim or Katrina did; the attention he did receive was predominantly negative in tone. The smiles and laughter that characterized almost every interaction Mr. Martin had with Tim were rare in Mr. Martin's interactions with Henry. In contrast to the mathematical orientation of Tim's interactions with Mr. Martin and the at times social, at times mathematically dependent orientation of Katrina's interactions, the orientation of most of Henry's interactions with Mr. Martin was procedural. That is, Mr. Martin most often talked to Henry about completing assignments and threatened to call Henry's parents about his lack of effort.

A student who received almost no attention from the teacher was Chris, a white female. Chris rarely sought attention from Mr. Martin or asked him questions. For most of each class period, she worked independently on mathematics assignments. Unlike Tim, who made an announcement to the entire class when he finished his work, Chris would quietly get out a library book and begin to read when she finished an assignment. When Chris did interact during the class period, it was usually with Wendy, the white female student who sat next to her. There were times when Wendy, who sought only a little more attention from Mr. Martin than Chris, would go to Mr. Martin's desk to get help, return to her desk, and answer a question from Chris about the same topic. During the times when Mr. Martin walked around the room helping students with their seatwork, both Chris and Wendy, on those rare occasions when they asked for help, were content to sit quietly with their hands in the air for extended periods of time while Mr. Martin helped those students who demanded his attention by calling out to him.

How Mr. Martin interacted with Tim, Katrina, Henry, and Chris does not reflect how he interacted with each student of their respective race and sex. Nonetheless, the race and sex of these students must be considered in attempting to understand the interactions they had with Mr. Martin. Determining Mr. Martin's intentions became important in understanding his interactions with these four students because what we observed was the result of both intended and unintended actions on his part. We found that knowledge of his intentions affected how we interpreted what we observed in the classroom. Knowing what he wanted to do with his students made some of his inap-

propriate actions understandable, if not acceptable. Furthermore, the students were not passive recipients in the interactions process; their role in molding the form and content of teacher-student interactions must be recognized.

Interviews with Mr. Martin indicated that he saw much of himself in Tim and that he intended to interact with Tim in the way that we observed. As was true during class, even the mention of Tim's name in the interviews brought a smile to Mr. Martin's face and made him laugh. He did not seem to think about and was not concerned about the consequences for the rest of the students of Tim's role in the classroom. When we explicitly asked if Tim's actions might have a negative effect on what the other students learned, Mr. Martin could not identify any such effect. He clearly saw Tim as the best mathematics student in the class, even in the face of his own evidence that Bob's class average was higher than that of Tim. He explained Bob's performance as a function of his relationship with Tim, not in the sense that Bob "copied" from Tim, but in the sense that Bob benefited simply by sitting next to Tim and being motivated by him. Mr. Martin chose to view the negative responses of other students toward Tim not as a sign that Tim might be having a negative impact on the learning but as a normal response of people to those who do well. In fact, he accepted the negative responses to Tim because he saw them as a source of motivation for Tim to do even better. Mr. Martin was much more concerned about the effect of classroom events on Tim than about the potential negative effect of Tim's actions on his fellow students. He consistently mentioned his goal of motivating Tim to perform even better and of not having Tim doubt himself.

Mr. Martin was not as concerned about maintaining Henry's confidence in himself as a learner of mathematics as he was concerned that Henry not fall victim to what Mr. Martin termed the "athletic syndrome." Mr. Martin's experience as a black student-athlete in college seemed to make him more sensitive to the academic risks involved in an interest in athletics. He was afraid that Henry's early success as an athlete might make him neglect academics. Mr. Martin was convinced that black athletes were capable of performing well in the classroom but that, too often, they neglected academics because they expected to become professional athletes. He expressed some bitterness about the treatment he and other black athletes received in college and wanted to be sure that the black male students he worked with recognized the importance of academic success for their futures. Mr. Martin clearly stated that some of his interactions with Henry were a result of his concern that Henry not fall victim to the athletic syndrome.

Mr. Martin's interactions with Katrina and Chris were not intended in the same sense that his interactions with Tim and Henry were. For example, he did not purposely focus many of his interactions with Katrina on social topics; furthermore, he said nothing in the interviews about Katrina's mathematical dependence on him and seemed to be unaware of it. On the other hand, Mr. Martin expressed concern about the limited number of black students in advanced mathematics classes and, in the case of the four

black female students who sat together, said that he wanted them to provide a peer support system for each other. However, his concern about a support system seemed to focus only on these four black female students and not on the other four black students in the class, one of whom was female.

Mr. Martin expressed some concern during interviews about his lack of interactions with Chris. He gave no indication that any of his interactions with Chris were intended to achieve a specific goal. He clearly saw Chris as being a very capable mathematics student, saying that she and Tim would be the two students from his class who may have been able to succeed in the highest mathematics ability group (which was one group above the high average group they were in). However, he said nothing about the need to spark a competitive urge in her or to keep her from doubting herself, which were the concerns he expressed about Tim.

Although our observations of class sessions led us to raise questions about how fair Mr. Martin was in his differential treatment of students, the interviews made us recognize how complex the issue was. We were concerned about Mr. Martin's interactions with all four of the students and surprised that in the case of the two male students he was essentially doing what he planned to do. It is significant, we think, that he had a more explicit plan for working with the two male students. Mr. Martin clearly stated his faith in all of the students in the class; all of them, he felt, were capable of succeeding in mathematics in his class and in subsequent classes. However, the fact that he had a plan to encourage the mathematics learning of Tim and Henry but no comparable plan for Katrina and Chris reflects differences that did not appear in his general statements about the ability of the students in his class and about the importance of mathematics for their futures.

The fact that Mr. Martin had plans for working with Tim and Henry does not mean that the plans benefited both boys to the same extent. Furthermore, the two boys were not passive recipients of plans completely designed and implemented by Mr. Martin; in fact, both boys played important roles in shaping Mr. Martin's behavior. What Mr. Martin did with Tim seemed to us to clearly aid Tim's performance in mathematics. Mr. Martin's interactions with Henry, which were guided by his concern about the athletic syndrome, did not have the same kind of positive effect on Henry. Part of Mr. Martin's response to Henry was due to the fact that Henry did seem to have some difficulty in finishing his work. However, other students also had difficulty finishing their work and did not receive the same treatment Henry did. Therefore, although it is significant that Mr. Martin had a more explicit plan for working with the two male students, the effect of the plans was not the same for Henry as it was for Tim.

Simply knowing which of Mr. Martin's actions were intentional and which were not made us more aware of the possible conflicting outcomes teachers face as they attempt to achieve worthwhile goals. And, in the case of all four students, but especially in Tim's case, knowing Mr. Martin's intentions highlighted the ethical dimension of

teachers' work. What Mr. Martin did for Tim helped Tim while having negative consequences for at least some of the other students in the class. We believe this is a clear example of the tension that exists between the goals of excellence and equity.

Equal treatment

In addition to noticing during our observations that Mr. Martin treated individual students differently, we also noticed that in some areas students received equal treatment. More importantly, we noticed students responded differently to this equal treatment. That is, the equal treatment led to different outcomes for different students.

A major topic that continued to come up in our discussions of classroom observations was the issue of clarity. In short, we believe that Mr. Martin was not as clear as he might have been in a number of areas. The main area was giving students directions about classwork and homework; he was also inconsistent in how he followed up on assignments. For example, based on the questions students asked as they left class each day, we inferred that not only were they often confused about whether homework was assigned but they were also confused about the specific content of assignments. There were also times when Mr. Martin assigned a particular page for the students to complete in class without clarifying exactly which exercises he wanted them to do; the students knew that only some of the exercises were to be completed but were not certain of which exercises had to be done. And there were times when, after Mr. Martin assigned particular exercises from a given page, he later changed the assignment, or at least responded differently to different students' questions about what had to be done. In one specific instance, after Mr. Martin had assigned the even exercises on a page, Bob, who was not sure about the assignment, asked Mr. Martin what had to be done. Mr. Martin answered, "Do them all if you want to."

The importance of understanding a teacher's intentions is also involved here. In the interviews with Mr. Martin, he stated that he intended to be less than specific about assignments because he wanted his students to develop more responsibility and independence. He wanted students to do their assignments out of a desire to gain more knowledge of mathematics, not simply because they were told to do the work. He felt that comments like his response to Bob would foster such responsibility and independence.

The effects of this equal treatment, however, were not the same for all the students. Most students in the class seemed to be able to deal with Mr. Martin's lack of clarity. They kept asking questions about assignments until they got an answer acceptable to them. In interviews, they told us about coming in after class to ask Mr. Martin again about what the homework assignment was or calling each other in the evening for clarification. However, it was more difficult for some students than others to adjust. For example, Henry and James, another black male student who sometimes had trouble completing assignments but whom Mr. Martin did not see as a potential victim of the athletic

syndrome, sometimes suffered as a result of Mr. Martin's lack of clarity in giving assignments

A second major example of equal treatment leading to different outcomes has to do with Mr. Martin's general teaching style. Mr. Martin rarely conducted lessons with the whole class where he would explain the content of that day's work. Instead, he would most often assign pages of work at the beginning of the period and help individual students as needed. Occasionally, if many people needed help, Mr. Martin would interrupt the individual seatwork in progress in order to explain an idea to the whole class. Mr. Martin explained in the interviews that he believed this teaching style was appropriate for this class of students and for the content they were covering.

Also as was true in the case of Mr. Martin's clarity, this equal treatment of students led to different outcomes. In our interviews with students, we found a wide variety of responses to this aspect of Mr. Martin's teaching style. For example, Chris was very positive about this style because she liked the fact that she did not have to sit through teacher explanations she felt she did not need; Chris preferred to go ahead and work on her own. Interestingly, in one of our interviews with Mr. Martin, he worried that Chris was one of the students who might need more structure, seemingly referring to both the clarity and teaching style examples. Despite the fact that Chris appreciated Mr. Martin's teaching style, we believe his concern about her was justified. Over the course of our observations, Chris received very little teacher instruction in mathematics because she was so reluctant to initiate interactions with Mr. Martin. And even though Mr. Martin's teaching style allowed Chris to work on her own, his organization of the class and her reluctance to ask him for guidance led to numerous occasions where she sat quietly at her desk reading a library book when she could have been doing mathematics. There is nothing wrong with reading a library book, but she was doing it during the brief period of the day set aside for mathematics. Based on her grades and performance on tests, Chris was a successful mathematics student. However, the amount of new mathematics she learned was certainly limited by her lack of interaction with the teacher. And although Chris was positive about Mr. Martin's teaching style, she expressed negative attitudes about mathematics: She did not like mathematics and did not see it as being very useful for her future. The challenge and motivation that Mr. Martin openly intended to provide Tim was not provided for Chris.

In student interviews, Katrina and Thelma, another member of the group of four black female students,

expressed some of the strongest disapproval of Mr. Martin's teaching style. Both of them referred to their mathematics teacher from the previous year as having the kind of teaching style they preferred. According to Katrina and Thelma, this teacher began each period with a whole-class review of previous work and explanations of new work. We observed, however, that, unlike Chris, the group of four black females did receive a significant amount of teacher instruction in mathematics primarily because they demanded help from Mr. Martin.

The situation in Mr. Martin's classroom was extremely complex. Katrina's constant seeking of help from Mr. Martin perpetuated her mathematical dependence on him while giving her more instructional time with him. Chris demonstrated a great deal of independence while receiving very little instructional time. Tim's independence, combined with his constant demand to be the center of attention in the classroom, led to very different consequences than Chris's more passive independence. The point is that equal treatment, defined as the the same teaching style, led to very different outcomes.

Conclusion

Mr. Martin is a sensitive, caring teacher who wanted all of his students to do well and who believed that they all could do well. Yet in his classroom we can see the tension that exists between excellence and equity. Even more important, we believe that the classroom observations and interviews provide convincing evidence of how difficult it is to treat students in an equitable manner. When should all students be treated the same? When should they be treated differently? Equity is elusive even when we want to achieve it.

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