

The teacher continually assesses students' progress through questioning, direct observation, and use of results of homework. The teacher modifies instruction as needed. Before taking a test, students should have a clear idea of exactly what is to be tested so both students and teachers are confident that the material has been learned. Surprises and trick questions should be avoided, but challenging questions that not all students are expected to answer correctly can be included and should be labeled as such. Before taking tests, students should be taught how to review for a test and how to take a test.

Expectations and the Learning Environment

The classroom of a teacher with high expectations is an orderly and friendly place in which students are expected to have consideration for each other; students should be expected to contribute to each other's learning. A teacher with high expectations makes every minute count for learning, with students kept on task from opening bell to closing bell (Johnson 1982).

A teacher with high expectations creates a nonthreatening learning environment in which students are encouraged to ask questions and take risks. Students should have opportunities to talk to each other about mathematics in small groups. They may be afraid to ask questions and appear stupid in front of a full class of their peers, but they are more willing to open up in small groups.

Cooperative learning is a practice that has great potential for enabling more students to learn algebra. In cooperative learning, students work together in groups of two to six students with a structure that rewards each member of a group when the entire group is successful. For example, the group can study together, take tests individually, and then each member of the group receives bonus points if all of the members of the group achieve above a certain score. This structure adds students' expectations for each other to individual student expectations and teacher expectations. Cooperative groups should be structured by the teacher to be heterogeneous by sex, ethnic background, and achievement level. Results from research indicate that cooperative learning promotes achievement, positive self-concept, and mutual understanding (Johnson & Johnson 1988–89). Cooperative learning is efficient because it uses the resource of the students' helping each other; when the teacher is called to give assistance more than one student at a time is helped. In cooperative groups students have opportunities to verbalize mathematics and to work on more challenging problems than they would be able to solve individually.

Teacher Expectations and Treatment of Students

Studies have revealed patterns of differential treatment by teachers of students for whom they have different expectations (Good 1987). For example, students with lower expectations tend to be seated farther away from the teacher, to be called on less often, and to have less attention paid to them by the teacher. The lower involvement of students with low teacher expectations is probably caused by both the student and the teacher. The student does not want to be bothered or embarrassed, and the teacher wants to focus efforts where they will do the most good.

In interacting with low-expectation students, the teacher gives less feedback,

gives shorter waiting time for answers, and offers fewer clues to help the student with the answer. When the teacher has high expectations and believes that the student should be able to answer correctly, more wait-time is given and, if necessary, clues are provided. The teacher does not want to waste a lot of class time on a student who the teacher believes will not be able to answer correctly. The result is that the students who need the most help receive the least. Teachers can eliminate the differential wait-time problem by first asking the question, then allotting ample wait time for the whole class to think about it, and finally naming the student who is being asked to respond. This process keeps the entire class alert.

Low-expectation students tend to be criticized more often, praised less often, and interrupted more often. The teacher may be interacting with the student under the assumption that the student is more interested in disrupting the class than in learning. Low expectations contribute to a deterioration of the learning environment and are detrimental to learning.

Finally, teachers may demand less effort from low-expectation students and reward them for marginal responses. The teacher may be well-meaning, but the results can be devastating. Students may receive the message that the teacher doesn't expect as much from them as from other students and, therefore, that they don't need to put forth as much effort. The students may also receive the message that since acceptable work is not being required, the teacher has given up on them.

Many teachers do not treat students differently according to their expectations, but some do exhibit some of these characteristics. Teachers can identify and correct any differential treatment they have of students through a process of asking an observer to visit their classes and record their interactions with students for whom they have different expectations. Then the teacher can work on any problems that are identified.

Expectations, Algebra, and the Curriculum

To meet the expectation that most students can be successful in algebra and then go on to higher mathematics courses, some curriculum realignment must take place. The elementary school curriculum should move away from rote learning of computation to a focus on developing understanding of the mathematical concepts needed for learning algebra and geometry. A recent review of mathematics textbooks examined the percentage of pages at each level that contained any new material not contained in previous levels. The study revealed that in mathematics textbooks the percentage of pages of new material gradually decreases from a high of 100 percent in kindergarten (there is no previous level) to a low of about 30 percent in eighth grade. Then in algebra, which is usually taken in ninth grade, the percentage of new material jumps to about 90 percent (Flanders 1987). No wonder elementary algebra is so critical in the filtering process. A different focus in grades K–8 can help turn algebra from a filter to a pump.

Along with high expectations comes the need to give the algebra curriculum new focus to offer students instruction that is relevant to their future and eliminate content that is irrelevant and unnecessary. The algebra curriculum should emphasize understanding of algebraic concepts; applications of algebra in science,

business, and other fields; and relationships between algebra and geometry. In the future, most symbol manipulation will be done electronically, so topics like factoring and simplification of rational expressions can be de-emphasized.

Algebra and Parental Expectations

Parental expectations can play a critical role in determining whether a student successfully completes algebra. Parents in upper-middle-class families tend to expect their boys and girls to complete successfully elementary algebra and higher level mathematics courses. They usually encourage the students to enroll in algebra and insist that they apply themselves. These parents are most likely to visit school and to be in touch with teachers, counselors, and administrators. If a student is not doing well, upper-middle-class parents are likely to provide direct help or arrange for tutoring.

Students whose parents have limited education may be at a disadvantage because of lack of parental support. However, that situation can be overcome. The school should let the parents know that algebra is extremely important to their children's future and that the students can learn algebra if they apply themselves. The most important educational role that a parent plays is in the encouragement of the students and the monitoring of their studying. Parents do not need to know algebra to help their students learn algebra. Comparative studies involving parents from the United States, Japan, and Taiwan present evidence that the monitoring role of parents is much more important than the tutoring role (Stevenson 1986).

Having high expectations for algebra students implies that a creditable standard of achievement will be expected of all students who take algebra. We must define and assess achievement on the basis of essential learning that students will need for the future. Students are hurt if they are given algebra credit when they have not learned the material that will be needed in later courses. They will have been dead-ended because they lack the empowerment for later success.

Multiple Opportunities for Learning Algebra

Although a common standard should be adopted for students receiving credit in algebra, we need to recognize that even though the same finish line should be used for all, not everyone is starting at the same place. Nor is it necessary for everyone to finish at the same time. Previously the first-year algebra course was placed at the ninth-grade level and students who did not complete elementary algebra by the end of ninth grade terminated their formal mathematics experience. The expectations and opportunities for these students to participate in higher learning were severely restricted. Minority students and students from low-income families tend to be disproportionately represented in this group of students. To remedy this situation we need to make special efforts to raise the expectations for groups of students who are underrepresented in algebra; we also need to take extra measures to ensure that they have the necessary prerequisite knowledge.

The opportunity to study algebra should always be available. One of the strengths of the educational system in the United States is the many opportunities it affords students who have not previously been successful. We must never give up on

students or allow them to give up on themselves. With high expectations, encouragement, and effective instruction, the algebra course can be converted from a filter that screens people out to a pump that propels people forward toward opportunity.

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