

MATH ANXIETY

HELPING STUDENTS LEARN TO SUCCEED

BY SYDNEY SAMUEL

Evidence now shows that difficulties in learning math are related to school anxiety,¹ math anxiety,² low teacher expectations,³ student expectations of failure,⁴ the belief that math is irrelevant to real life,⁵ and learning disabilities relating to long- and short-term memory, recall, coding, pattern recognition, visual memory, and thinking processes.⁶

This article will focus specifically on the reasons high school- and college-age students have difficulty mastering mathematics. First we will look at how mathematics difficulties develop and progress throughout the child's school experience.

The Primary Years: The Link to Future Failure

During this stage in their education, children receive instruction in basic arithmetic skills. In kindergarten through second grade, difficulty in acquiring related skills and knowledge may occur for a variety of reasons. The child's behavior may be difficult for the teacher to manage or modify, preventing the teacher from keeping the child consistently on task.⁷ Teacher expectations may also play a part, if the teacher believes that the child is incapable of learning because of the family background, race, ethnic group, or sex.

The student may be unable to conceptualize, store, or retrieve numbers

or numerical concepts essential to mastering basic arithmetic. If these learning difficulties are not identified and swiftly remediated, the child may experience a mounting sense of failure in relation to mathematics. The child may resist learning math skills, saying that he or she is bad at arithmetic or hates the subject. The child may begin

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to daydream or act out arithmetic lessons.

This type of progression in the early learning years establishes a deeply negative setting for further arithmetic or math instruction.

The Intermediate Level: Reinforcing Failure

At this point, a student may be pulled out of the regular class for special instruction in arithmetic, in order to remediate the arithmetic skill and knowledge deficiencies that have been increasing annually. If the teacher

does not provide the student with learning goals that are challenging but not intimidating, the child is likely to remain deficient in and resistant to arithmetic and mathematics.

However, some students who have done well in arithmetic up to this time begin to fail when they encounter high-school-level mathematics.

The Secondary Student

In secondary school, the student begins to receive instruction in mathematics rather than arithmetic. Some students who received very high grades in arithmetic throughout elementary school experience sudden and debilitating declines in achievement as they move into algebra and geometry. This decline should be explained to the student and parent as nothing more than an adjustment reaction that can be reversed through planned study and persistent, incremental effort toward short-term, highly specific and attainable goals.

On the other hand, negative feelings about math and personal competence may be reinforced if the child is scolded for not trying hard enough or is advised that "he must not be as good at math as he was in elementary

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school." Children *learn* to fail, just as they learn to succeed. The longer a child practices a failure response, the longer it will take him to reverse the behavior. If no intervention takes place, the child enters adulthood with the increasingly reinforced conviction that failure in mathematics is inevitable, and that he or she is "no good with numbers."

Expectation of failure in math often becomes a self-fulfilling outcome of anxiety related specifically to challenges in math. This is particularly true when the instructional program does not provide students with sufficient opportunity to experience substantive incremental success at a pace suited to their abilities.⁹

We will now look at how anxiety contributes to failure in math at the high school, college, or other levels of schooling.

Anxiety: A Matter of Degree

A precise definition of anxiety is hard to derive from the literature, but most experts agree that it can be viewed as an outcome of an

"approach-avoidance paradigm [related to] the need to avoid failure. The importance of this is that the school setting provides a natural laboratory in which many individuals are exposed to failure. The comprehensive series of studies of test anxiety by Sarason have likewise shown the stressor operative in the school setting."¹⁰

The extent to which anxiety generates or extinguishes productive, goal-oriented, persistent efforts to achieve appear to be directly related to the extent to which the student believes he or she will succeed in learning.¹¹ If the student's anxiety is dismissed, ignored, or accepted as an unalterable part of the personality, he or she is likely to continue to experience task-specific or generalized school anxiety as disabling rather than empowering.¹²

Failure anxiety can become a learned response that takes considerable time to overcome. During this time patient, supportive instruction must provide the student with substantive and consistent opportunities for success. Helpful remediation techniques include the following: (1) methodically testing the student's responses to various types of visual and verbal instruction, (2) offering hands-on opportunities for learning, and (3) using high levels of discussion in class. Using these approaches, high school and college level mathematics teachers can enable slow learners to make significant gains in achievement.

Overcoming Failure-Expectancy in the Older Student

Whatever the reason a student has failed to master basic mathematics—math anxiety, school phobia, or visual or verbal memory difficulties—by the time he or she reaches college, he may have developed strategies to avoid any math-related challenges. Even at this late date, instructional approaches can be developed to help the individual increase his or her mastery of the subject.

The student can learn to manage anxiety as surely as he or she learned to experience it. By using relaxation, imaging, and systematic desensitization strategies, the student can learn to overcome disabling emotional reactions, thus enabling him to acquire knowledge and skills that will bring him personal gratification and improved skills for employment.¹³

The instructor can help create a climate that enables the student to convert math anxiety into productive behavior, compensate for learning disabilities, and develop a plan to effectively attack the problem. While teaching the student to deal with anx-

iety, the instructor should communicate high expectations for improvement. This will enable older adolescents and college students to experience substantive gains in math skills. It will also enhance their self-esteem and career opportunities.¹⁴ □

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