The Failure of Failure

When a child fails, it should be regarded as a failure of the education system.

By John Mighton

When we make assessments of children, we expect them to see the world as we do. But their way of perceiving things is almost unimaginably different from ours.

In teaching mathematics, we shouldn't judge young students too quickly for failing to apply a rule correctly even after we have shown them a number of examples.

Children can be very creative in extending rules to cases they have never seen. For example, a child who learns to apply a rule using small numbers will often believe the rule changes or stops working beyond a certain point, as if a number could grow so enormous it causes things to break.

Many rules are also counter-intuitive in ways that may not be obvious to an adult. In adding two halves of separate pies, for example, one still has four pieces between the two pies. Why then, a child might wonder, isn't the denominator in the final fraction four?

Learning mathematics, even at the highest levels, is often a matter of getting used to things. There are concepts that become clear only after a great deal of use.

A few examples may not be enough to show a child, whose understanding has not been conditioned by years of experience, how to extend a rule to a potentially-infinite number of cases. Even the simplest instructions can be ambiguous to a student who is still learning to distinguish shadows from monsters.

All of the books of elementary mathematics I have read recently seem to expect children to master concepts and operations with very little practice, after being shown only a few (or often no) examples.

Several weeks ago, I found an exercise in a grade 3 book that asked students, in each question, to shade a given fraction of an array of boxes.

In most of the questions, the number of boxes in the array matched the denominator of the fraction; so the student simply had to look at the numerator of the fraction and shade that many boxes.

But halfway through the exercise, there was an array of 20 boxes with the instruction "Shade one-fifth of the boxes". Up to that point, students had not been taught anything about equivalent fractions, or even how to divide a number into equal parts.

Open almost any current book of elementary mathematics to any page, and you are likely to find an example of the sort of conceptual leap I found in that grade 3 book. Most textbooks appear to have been written in a great hurry and by teachers who have received insufficient training and support.

Students should never be expected, when learning a new operation, to employ knowledge or a skill that they haven't mastered. While this might seem like an obvious principle, it is, I believe, regularly ignored in schools.

It would be unwise, for instance, to teach a student who has a shaky grasp of the six-times table to add fractions by producing examples with denominators divisible by six. The strain of trying to recall the six-times table could only interfere with the student's ability to remember the steps.

In working with weaker students, a teacher can always break an operation into steps the student cannot fail to perform. This style of teaching need not be followed indefinitely; even the most delayed student, in my experience, will eventually begin to skip steps and deduce explanations. But unless teachers begin with extremely simple tasks, they are not likely to help the majority of their students.

In a typical elementary class, even among children who are only eight years old, an enormous difference exists between the weakest and the strongest students.

The most knowledgeable know their multiplication tables to 12, while the most delayed have trouble counting by two's. The fastest will finish a page of work before the slowest have found their pencils. And the most eager will wave their hands to answer a question while the most distracted stare vacantly into space.

Based on my work in schools, I am utterly certain that this gap is an artifact of our system of education — an illusion that can be dispelled more quickly and with fewer resources than even the most optimistic educator might expect. In an elementary class, the gap can be eliminated, or closed to a point where it doesn't affect the quality of the math program.

In my book, *The Myth of Ability*, I describe a teaching program that promises to do just that in 12 inner-city schools in Toronto. Six units from the JUMP (Junior Undiscovered Math Prodigies) manual are included in my book.

Schools cannot be improved simply by compelling students to write standardized tests, as many politicians seem to believe. Tests accomplish nothing if teachers aren't trained or provided with the means to prepare students to do well on those test.

After seeing how children flourish with even a modest amount of attention, I have come to believe that when a child fails a test, it should be regarded as a failure of our system of education.

(Adapted with permission from* The Myth of Ability. *Dr. Mighton founded JUMP — Junior Undiscovered Math Prodigies in Toronto. www.jumptutoring.org.)