

**Helping kids win the numbers game; All children can be good at math if they're shown their potential, Canadian professor says**

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Byline: Roger Collier

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Toymaker Mattel introduced the Teen Talk Barbie in 1992. Each doll could say four phrases, which were randomly selected from a pool of 270. One of those phrases -- "Math class is tough!" -- didn't go over well with many parents, who believed the doll perpetuated the commonly held belief that girls weren't good at math.

Mattel's president later admitted the company had made a mistake and allowed parents to swap the math-hating Barbies for ones that didn't complain about calculus.

Many people today, including some educators, still believe that math class is tough -- not just for girls but for all children, except the fortunate few born with a gift for numbers.

John Mighton, a poet, Governor General's Award-winning playwright and mathematician, doesn't see it that way.

"I think kids, almost without exception, are born with the ability to do well in math," says Mighton, who appeared in the Matt Damon and Ben Affleck film, *Good Will Hunting*.

In his new book, *The End of Ignorance: Multiplying Our Human Potential*, Mighton, 49, claims that school children are segmented into a strict hierarchy too early in their education. This is especially true in math, which, Mighton says, separates children like no other subject. Children good at math, the ones at the top of the hierarchy, receive praise and attention. Children ranked at the bottom are written off.

Although acknowledging that some students will always be stronger than others, Mighton says all students can reach a level of math competency far above what schools expect of them now, because math is not, contrary to popular belief, the most difficult subject in which to excel. In fact, Mighton claims, it may very well be the easiest.

Mighton, a professor of mathematics at the University of Toronto who also works for the Fields Institute for Mathematical Research, grew up in Hamilton and describes himself as an erratic grade school student. He was no math prodigy. His love of what he describes as "the beauty of mathematics" did not develop until he was in his 30s. He completed his doctorate in mathematics at the University of Toronto at age 42.

In 1998, Mighton founded Junior Undiscovered Math Prodigies, or JUMP, to provide free tutoring to Toronto's inner-city youth. The basic philosophy of the program is that by breaking math down into simple steps that any student can grasp, and then through vigorous training to master those steps, all students can succeed in math.

Mighton once worked with a Grade 2 class from inner-city Toronto that included several children designated as slow learners. After a month, every student in the class achieved a mark of at least 90 per cent on a Grade 7 fractions test.

In the JUMP program, tutors start with a confidence-building exercise that is designed so that all students can succeed. When a student doesn't understand something, the tutor accepts the fault and explains the topic in a new way. Students are praised for their efforts and encouraged to show off their new knowledge to their peers.

One of the more interesting ideas in *The End of Ignorance* is the concept of emergent intelligence. Mighton claims that by extensively practising simple mathematical steps, a child can suddenly jump to a new stratum of cognitive ability. Inactive parts of the child's brain can actually be rewired to perform new tasks.

"If you're patient and you add those drops of knowledge, one day they can achieve a whole new level of behaviour," says Mighton.

But for this to happen, children must be engaged, something Mighton says Canadian schools are also failing to do. "We are not giving teachers the means to capture the attention of an entire class."

Mighton says that all JUMP students remain engaged because all are given the chance to succeed. By not ranking students in a rigid hierarchy from best to worst, weaker students don't adopt a sense of hopelessness.

"We assume that there's a natural bell curve and kids respond to that," says Mighton. "They stop paying attention when they find out where they are on that curve."

Eventually, Mighton concedes, students will have to learn to cope with struggle or even failure. But that can come later, he says, when they have developed a degree of resilience.

The benefits of early success in mathematics are inestimable, says Mighton. And not just for those who go on to careers in science or engineering.

"All the cognitive abilities that they need in every subject, they can build quickly and very effectively in mathematics."

A love of mathematics can even help people better appreciate the environment, claims Mighton, by allowing them to discover the invisible laws and symmetry underlying all nature.

"We've excluded so many kids from that sense of beauty," says Mighton. "That's the greatest tragedy of neglecting mathematics."

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MATH SENSE INNATE, STUDY SUGGESTS

Children who had never been taught addition or subtraction were able to solve approximate math problems involving large numbers, researchers said yesterday in a finding that reveals a new understanding of children's innate math ability.

They said children's early struggles with math may be linked to the need to produce a precise number. Their finding could lead to better ways to teach math to young children.

Writing in the journal *Nature*, researchers conducted a series of experiments that found children were able to answer a series of math problems without prior math training.

Most of the children (65 per cent) were able to solve the problems without resorting to guessing or other means of calculation, and the finding could not have been the result of chance, the researchers said.