

IDEAS

Every child a math whiz

KEITH OATLEY

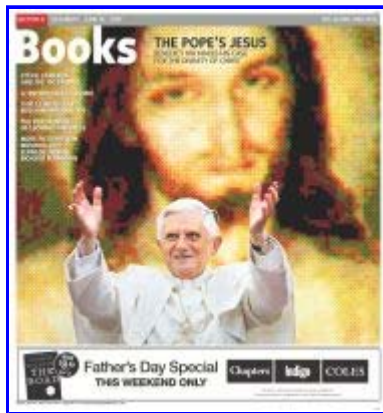
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THE END OF IGNORANCE

Multiplying Our Human Potential

By John Mighton

Knopf Canada, 313 pages, \$29.95

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John Mighton is on a campaign: Children should not be left behind in our schools. If in any pursuit - cooking, driving a car, mathematics - we measure performance, exactly half of those taking part will be below average. But in school, being below average is a step to being told that you have failed. As Mighton observes, there are differences in people's abilities. But do we want a school system that first accentuates such differences, and then takes them to define who people are?

Mighton has a PhD in mathematics and is an award-winning playwright. When he was younger, he worked as math tutor for primary-school children. He was struck by how even children labelled

hopeless could learn math by means of simple procedures. It turns out that, approached in this way, math was enjoyable for children, among the easier things to learn rather than among the more difficult. In 1998, Mighton developed his methods into a program, called JUMP, which stands for Junior Undiscovered Math Prodigies, which has been used in Canada, Britain and elsewhere. This book is about the program, and the principles that underlie it.

The End of Ignorance has three aspects. The first is that Canadian educational systems constantly classify children, by grades and in other ways, and these classifications are typically taken as measures of ability. Those whose measured ability is low often get left behind.

Different societies make different choices. Some, like China and Japan, concentrate on making sure that everyone has learned a procedure before the teacher moves on, and, rather than believing that inherited ability is the key, they believe in effort. Other societies, including Canada, concentrate on rewarding those who do best. Those who don't do well feel discouraged, and often give up.

In Canada, the problem for teachers is made hugely difficult by the wide variety of student ethnic backgrounds. It is in just such circumstances that children can get left behind. Mighton bolsters his argument with recent evidence from brain science and cognitive psychology, which indicate that the brain remains flexible for longer than had been thought. Focused coaching in particular problem areas can enable people to do things they never thought they could do. On this, Mighton is right. A system in which many children are judged as unable to make progress in math is not only wasteful, it's undemocratic.

The second aspect of *The End of Ignorance* is that Mighton claims JUMP will fix the problem of children getting left behind. He is brilliant at breaking down math problems into parts that children can do easily, which can then form more complex wholes. In the book, he describes such decompositions. When children work through these sequences, under closely structured teacher direction, with lots of praise as they complete each step and repeat it with small variations, unforeseen abilities emerge, sources of pride and confidence for the children.

The program has affinities to phonics in learning to read, which research has shown enables more children to learn to read fluently than the competing whole-language method, especially for children who do not take easily to reading. Those taught using phonics more readily acquire automatic recognition for words. They do not have to use their mental resources to work out what words are: They can use these resources to understand the meaning of what they are reading.

JUMP has already become controversial. Just as arguments about the best approach to reading led to what became known as the Reading Wars, so Mighton's method has been identified by some as a move in the Math Wars. The third aspect of *The End of Ignorance* is that Mighton is an enthusiast. He has worked enormously hard as a volunteer in his program. Money from materials he produces doesn't go into his pocket, but into JUMP Math, a charitable organization. For this, he deserves, and gets, a lot of respect.

New ideas in education are not uncommon. Among the problems they face are gaining a hearing, and then achieving evaluation in the context of systems of pedagogical belief and practice built up over years. Sometimes a new method turns out to have more to do with the personality of the teacher than with the method itself. Inevitably, what goes into the school curriculum becomes based on many considerations, so evangelism may be a good move at this stage: getting people interested in the issue. This, Mighton achieves.

Properly speaking, whether Mighton's methods are incorporated into the curriculum should depend on evaluations that are only now being put in place to compare them with currently accepted methods. My prediction is that just as reading methods that include phonics have been shown to be important for literacy, so math procedures of the kind taught in JUMP will be important in numeracy.

Keith Oatley is director of the Cognitive Science Program, University College, University of Toronto. His novel A Natural History (1998) is about 19th-century society's resistance to evidence that germs cause infectious diseases.

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Waitzkin won his first U.S. national chess championship when he was 9, and was the subject of the film *Searching for Bobby Fischer*. Since then, he has taken up martial arts and earned another championship. In this book, he discusses his personal principles of learning, discipline and performance.

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