SQE FORUM
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FROM THE PRESIDENT

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If you like our newsletter and would like to help our work, please consider making a financial donation (any amount is appreciated) by clicking here. We do not receive any government funding, and we are often unable to undertake important projects because we cannot afford them. Contributions of any size will generate a tax receipt, along with our heartfelt thanks.

Your feedback helps us improve the *Forum.* Please e-mail me here.

Best regards, Malkin Dare

YOUR VOTE IS IMPORTANT TO US

Last month, we polled you to find out whether you would send or had sent your children to an independent (private) school. The results are as follows: 58% would send or had sent their children to an independent school; 37% had not; and 5% had no kids.

This month, we want to know whether you believe **classroom quality in Ontario** has improved, stayed the same or declined during the past four years. Please help us by clicking on vote. Afterwards, please explain your opinion by clicking on comments. This information will be very useful to us in the run-up to the October, 2007 Ontario provincial election. We will print your comments in the mail bag section of the next newsletter.

FREE ON THE WEB

There are all kinds of Internet sites devoted to education, and it's very time-consuming to find the good ones. From time to time, we will let you know about a worthwhile site. This month, we draw your attention to a web-site that provides free worksheets for download. There are worksheets for many elementary grade subjects, such as spelling, music, French, and math. Click here to access Keynotes Education's free worksheets.

MAIL BAG

Our readers' comments are always interesting and insightful.

Private Schools in Northern Ontario

Living in Northern Ontario, we had no private schools to allow us a choice. Both of our children attended public schools and did very well with very little effort. Both were very unchallenged, and it was often difficult to get them motivated/excited about going to school. In the past ten years, a Montessori school and two private (one-room) church schools have been established. *Sault Ste Marie, ON*

Cheating

My son, who is in his fourth year at Ryerson (electrical engineering), reports an interesting conversation with his teaching assistant (TA). Apparently, this TA twice caught a second-year girl cheating on the lab, but nothing happened. She failed the mid-term miserably, and he made a point of standing behind her during the exam and saw her hand in an 80%-blank exam. She still passed! When the TA asked the prof why, he was told the school has a quota for female engineers! *Toronto, Ontario*

Reading and Vision

I read with interest your article on older children with reading difficulty. Towards the end, you make a statement that there is really no "dyslexia" that makes reading impossible. I am not sure whether your statement is "there is no dyslexia" or that it is not impossible to learn to read, even with a diagnosis of "dyslexia". My daughter was nine and a half years old and still could not read, after four years of phonics training. She would always say, "It is just too hard." Well, after seeing a special behavioral optometrist, she was diagnosed with significant vision difficulties that made it very difficult for her to read. After 12 weeks of "vision therapy", she is no longer a non-reader, but well on her way to becoming a proficient reader, with a desire to read on her own. She most likely would also have been given a diagnosis of dyslexia. More awareness is needed of behavioral optometry. I am sure that many children who have significant problems with reading could be helped with an accurate vision assessment, and visual therapy.

OUR MISTAKE

Our last issue recommended a YouTube video criticizing current U.S. math texts, but gave the wrong URL; it should have been http://www.youtube.com/watch?v=Tr1qee-bTZI. We said that the same criticisms would be valid for "Canadian texts such as *Math Quest*". In fact, *Math Quest* is not approved for use in Ontario public schools, but the texts which are approved for Ontario – *Nelson Mathematics* and *Mathematics Makes Sense* – are subject to the same criticisms.

WEB-SITE OF THE MONTH

This month, we feature Harvard professor Carolyn Hoxby's web-site because her work is so relevant to school choice. For example, her paper "How School Choice Affects the Achievement of *Public* School Students" reports that "public schools are induced to raise achievement when they are faced with competition…The choice reforms that are currently in place do not appear to generate winners and losers, but only winners." Click here for Professor Hoxby.

FEATURE ARTICLES

The Inverse Power of Praise

By Po Bronson

For a few decades, it's been noted that a large percentage of all gifted students (those who score in the top 10% on aptitude tests) severely underestimate their own abilities. Those afflicted with this lack of perceived competence adopt lower standards for success and expect less of themselves. They under-rate the importance of effort, and they overrate how much help they need from a parent.

When parents praise their children's intelligence, they believe they are providing the solution to this problem. According to a survey conducted by Columbia University, 85% of American parents think it's important to tell their kids that they're smart. In and around the New York area, according to my own (admittedly non-scientific) poll, the number is more like 100%. *Everyone* does it, habitually. The constant praise is meant to be an angel on the shoulder, ensuring that children do not sell their talents short.

But a growing body of research—and a new study from the trenches of the New York public-school system—strongly suggests it might be the other way around. Giving kids the label of "smart" does not prevent them from underperforming. It might actually be causing it.

For the past ten years, psychologist Carol Dweck and her team at Columbia (she's now at Stanford) studied the effect of praise on students in a dozen New York schools. Her seminal work—a series of experiments on 400 fifth-graders—paints the picture most clearly.

Dweck sent four female research assistants into New York fifth-grade classrooms. The researchers would take a single child out of the classroom for a non-verbal IQ test consisting of a series of puzzles—puzzles easy enough that all the children would do fairly well. Once the child finished the test, the researchers told each student his score, then gave him a single line of praise. Randomly divided into groups, some were praised for their *intelligence*. They were told, "You must be smart at this." Other students were praised for their *effort*: "You must have worked really hard."

Why just a single line of praise? “We wanted to see how sensitive children were,” Dweck explained. “We had a hunch that one line might be enough to see an effect.”

Then the students were given a choice of test for the second round. One choice was a test that would be more difficult than the first, but the researchers told the kids that they’d learn a lot from attempting the puzzles. The other choice, Dweck’s team explained, was an easy test, just like the first. Of those praised for their effort, 90% chose the *harder* set of puzzles. Of those praised for their intelligence, a majority chose the *easy* test. The “smart” kids took the cop-out.

Why did this happen? “When we praise children for their intelligence,” Dweck wrote in her study summary, “we tell them that this is the name of the game—look smart, don’t risk making mistakes.” And that’s what the fifth-graders had done: They’d chosen to look smart and avoid the risk of being embarrassed.

In a subsequent round, none of the fifth-graders had a choice. The test was difficult, designed for kids two years ahead of their grade level. Predictably, everyone failed. But again, the two groups of children, divided at random at the study’s start, responded differently. Those praised for their effort on the first test assumed they simply hadn’t focused hard enough on this test. “They got very involved, willing to try every solution to the puzzles,” Dweck recalled. “Many of them remarked, unprovoked, ‘This is my favorite test.’

Not so for those praised for their smarts. They assumed their failure was evidence that they weren’t really smart at all. “Just watching them, you could see the strain. They were sweating and miserable.” Having artificially induced a round of failure, Dweck’s researchers then gave all the fifth-graders a final round of tests that were engineered to be as easy as the first round. Those who had been praised for their effort significantly improved on their first score—by about 30%. Those who’d been told they were smart did worse than they had at the very beginning—by about 20%.

Dweck had suspected that praise could backfire, but even she was surprised by the magnitude of the effect. “Emphasizing effort gives a child a variable that they can control,” she explains. “They come to see themselves as in control of their success. Emphasizing natural intelligence takes it out of the child’s control, and it provides no good recipe for responding to a failure.”

In follow-up interviews, Dweck discovered that those who think that innate intelligence is the key to success begin to discount the importance of effort. *I am smart,* the kids’ reasoning goes; *I don’t need to put out effort.* Expending effort becomes stigmatized—it’s public proof that you can’t cut it on your natural gifts.

Repeating her experiments, Dweck found this effect of praise on performance held true for students of every socioeconomic class. It hit both boys and girls—the very brightest girls especially (they collapsed the most following failure). Even preschoolers weren't immune to the inverse power of praise.

In the opinion of cognitive scientist Daniel T. Willingham, a teacher who praises a child may be unwittingly sending the message that the student reached the limit of his innate ability, while a teacher who criticizes a pupil conveys the message that he can improve his performance even further.

(Excerpted with permission from "How Not to Talk to Your Kids" in New York*, Feb.19, 2007. http://nymag.com/news/features/27840. Mr. Bronson (b. in 1964) is an American journalist and author who lives in San Francisco.)*

Spirit of Math

By Anthony Reinhart

Young as he still is at 34, Professor Nima Arkani-Hamed was far younger when he walked into a high-school classroom and found proof that the universe was, indeed, expanding. He was in Grade 8 at Zion Heights Junior High School in northern Toronto, and the classroom belonged to Charles Ledger, a teacher who had developed his own brand of supercharged math instruction for high-performing students ready to go beyond their textbooks.

Of course, Dr. Arkani-Hamed could not have predicted the precise sequence that would land him where he is today: at the utter limit of humanity's understanding of the universe, as one of the world's top particle theorists, with a fully tenured teaching post at Harvard to boot.

Instead, he focused on what was in front of him – interesting problems and drills, drills, drills – and suddenly, his world got bigger.

"It was an amazing atmosphere that wasn't replicated for me until well into my college years," Dr. Arkani-Hamed said this week, seated beside his former teacher, now 74, after they reunited in a high-school classroom in Waterloo, Ont. "At a very truly fundamental level, it started me off in the sort of frame of mind that I keep and carry with me today."

Moments later, that frame of mind opened up for a crowd in the Waterloo Collegiate auditorium when the long-haired physicist, in his black pants and black untucked shirt, took the stage to deliver a mind-bending public lecture called The Future of Fundamental Physics.

"I realize this is a rather modest title," Dr. Arkani-Hamed said to laughs from an audience dotted with scientists from Waterloo's Perimeter Institute for Theoretical Physics, which played host to the event and ar-

ranged to bring Mr. Ledger and his family to it from the Toronto area.

Mr. Ledger began to develop his unique teaching method in the mid-1970s in response to difficulties students at Zion Heights were having with algebra. He came up with a series of drills, and then backed them up with a process of teaching to support them. All of it was more complex than what was contained in the math textbooks of the day.

As he fine-tuned his methods, "we started to work away from the texts," Mr. Ledger said, and "eventually we were teaching without using the texts at all." Before long, Zion Heights teams were cleaning up at regional, provincial and national math competitions, and Mr. Ledger's program, eventually dubbed Spirit of Math, began to attract notice. Still, education officials deemed it impractical to adapt for widespread use, mainly because of the retraining teachers would require to deliver it.

So, after he left teaching at the school in 1993, Mr. Ledger took the program private. His daughter, Kim Langen, now oversees Spirit of Math, in which parents can enroll children who are already adept at math for weekly, 90-minute classes to hone their creative problem-solving skills. The approach aims to equip students (900 are enrolled in Greater Toronto and Winnipeg) to discover answers on their own, rather than by rote. Ms. Langen said teachers are also encouraged to challenge students, and to teach to the top third of the class, rather than to the weakest.

"Our whole methodology was so different, and because of that, people were really hesitant to accept it," Ms. Langen said, recalling the public-school system's refusal to embrace the program despite its clearly positive results. "And like any place, there's some jealousy happening," she said, perhaps since it arose organically, out of a single teacher's simple desire to find a better way.

Back at the Perimeter Institute after his talk, relaxing in the Black Hole Bistro, Dr. Arkani-Hamed used the same kind of language to describe the forces that push scientists to the frontiers of understanding. "What really drives them is a deep sort of curiosity," he said. "It doesn't feel like playing a game; it doesn't feel like chess; it doesn't feel like solving a puzzle; puzzles are invented by humans." In physics, there's a sense of discovery, and what it contains is far beyond what we imagined we could have imagined."

(Reprinted with permission from The Globe and Mail, *February 12, 2007)*

Being of Real Help

By Malkin Dare

Because literacy is so important, well-meaning people in hundreds of Canadian organizations are hard at work every day trying to help the many Canadians who struggle with reading.

For example, thousands of volunteers are going into schools to listen to kids read. Hockey players and politicians read stories aloud and tell kids how important reading is. Books are donated, committees are formed, millions of dollars are raised, editorials are written – all trying to help remediate Canada's serious literacy problem.

Yet, nothing changes. The percentage of Canadians who can't read well enough to meet most everyday demands, according to Statistics Canada, holds steady at about 42%.

Why is all this effort not paying off?

The answer may lie in the nature of the effort. If you look closely, you will notice that almost every program is based on the assumption that poor readers just need to read more. Essentially, the thrust is either to make poor readers want to read more and/or to make sure they do.

Why do we keep on with these efforts if they are not paying off? After all, one definition of insanity is doing the same thing over and over again and expecting different results.

The answer may be that nobody knows what else to do. Most people presume that poor readers have already received first-class reading instruction at school. After all, this is what education leaders are saying.

And if their reading instruction has already been taken care of, then the source of poor readers' problems must be either that they are unmotivated or that they need more practice, or both. So it makes sense to make them want to read a lot and to give them the opportunity to do so.

But what if many poor readers are in trouble because they have not yet received the necessary first-class instruction at school? If this is the case, then all the motivation and practice in the world will not help them.

Regular readers of the *SQE Forum* will not be surprised when I suggest that some Canadian teachers may not be providing first-class reading instruction. After all, the faculties of education give teachers very little training on how to teach reading, and most Canadian school boards promote a flawed method called Balanced Literacy.

The Balanced Literacy approach uses memorization and guessing, instead of direct, systematic phonics teaching. In fact, Balanced Literacy explicitly rejects the use of systematic phonics, spelling, or grammar instruction.

Recent developments in Scotland (Clackmannanshire and Dunbartonshire) show that students taught with systematic phonics become excellent readers. In Dunbartonshire, education leaders expect to have no 11-year-old children unable to read at grade level by the end of this school year. By contrast, Ontario's provincial tests show that at least 36% of 11-year-olds are unable to read at grade level.

There is much other research showing that systematic phonics is the best way to teach children to read. As *Time Magazine* reported, "Indeed,

the evidence is so strong that if the subject under discussion were, say, the treatment of the mumps, there would be no discussion." Professor Keith Stanovich, a world authority on teaching reading, writes, "That direct instruction in alphabetic coding facilitates early reading acquisition is one of the most well-established conclusions in all of behavioural science."

And yet most Canadian teachers are still not using systematic phonics to teach their students to read. Without systematic phonics, all of the volunteer work and all of the donated money are close to useless.

It is a shame to waste so many people's time and money on programs that can't work. It's also regrettable that poor readers are being set up for further failure.

Instead of continuing to pour our national resources into remedial efforts that are not working, I suggest that well-meaning Canadians begin directing their energies towards convincing educators to use systematic phonics in the first place.

(Mrs. Dare is a former teacher and homeschooler, and a reading tutor, as well as the president of the Society for Quality Education.)

WHAT'S NEW?

Ontario's Only Public Traditional School Shut Down

After years of trying, York Region education officials have succeeded in shutting down Ontario's first and only public traditional school, Flowervale Public School. As of September 2006, the building is being used for students with special needs. Flowervale achieved exceptional results on the provincial tests, despite its location in a blue-collar neighbourhood and despite the fact that it exempted no students from the tests. more

Kids Can Learn – But Can Educators?

New research shows that a world-class elementary school math curriculum can be successfully transplanted into North American school districts and provide immediate and stunning performance improvements in urban school districts with high percentages of at-risk, economically-disadvantaged, and English-learning immigrant students, as well as in more affluent suburban districts. Virtually no special teacher training was required to achieve these results. more

British Columbia Promises Improved Quality, Choice, and Accountability

BC's Feb. 13 throne speech promises a number of changes to public education, including giving the Minister more capacity to create provincial schools and offer more choice in learning, and providing teachers with financial incentives to improve their students' achievement. more

First State-Wide School Voucher Program

Utah has become the first US state to provide school vouchers to every student in the state. It will let families spend between $500 US and $3,000 US in public funds per child on private school tuition. more

The Great Global Warming Swindle

This 45-minute BBC video proves that global warming has nothing to do with carbon dioxide, but rather is caused by solar activity. view

BOOK REVIEWS

Dumbing Down: Outcomes-based and politically correct – the impact of the Culture Wars on our schools. Kevin Donnelly. Hardie Grant Books. 2007. 230 pages.

This book describes Australia's latest educational fad: Outcomes-Based Education (OBE). OBE has already come and gone in Ontario (during the nineties), but its influence lingers on – embedded in the curriculum and the EQAO tests based on that curriculum, and continuing to dominate educators' thinking. In many educators' minds, OBE justifies such things as automatic promotion, low standards, evangelistic environmentalism, fuzzy report cards, and child-centred learning. This interesting excerpt discusses the true purpose of the modern emphasis on teaching "critical Literacy" (known in Canada as "critical thinking").

Excerpt (pages 146-147)

"The President of the Australian Capital Territory Association for the Teaching of English, Rita van Haren, in addition to acknowledging the influence of Paulo Freire, also argues that critical literacy has a powerful role to play helping students analyse texts in terms of power relationships. Ms van Haren suggests that one reason why critical literacy is under attack is the possibility that 'government ministers do not want ordinary citizens to be able to question their political decisions.'

"The Tasmanian education department's website, in outlining the importance of English as a subject, defines critical literacy as 'the analysis and critique of the relationships among texts, language, power, social groups and social practices'.

"Those familiar with what was once termed clear thinking will appreciate that a vital aspect of English teaching has always been to instruct students how to critically evaluate arguments, to recognize different types of persuasive techniques and to understand how individuals, and the public more generally, can be manipulated. For many years, clear thinking was an important part of courses like Victoria's Matriculation English Examination. It is also true that classic novels like *Brave New World* and *Animal Farm* and Swift's pamphlet *A Modest Proposal* deal in a very explicit way with a range of persuasive techniques employed to control the way people feel and think.

"Within the culture wars, clear thinking is re-badged as critical literacy and given a left-wing slant. Students, no longer taught how to identify and deal with different persuasive devices, such as generalizations and ad hominem arguments, are instead taught to analyse texts in terms of power

relationships and what is considered politically correct, especially in areas such as gender, ethnicity and class. The Tasmanian website, when outlining the benefits of critical literacy, suggests:

> '*Critical literacy provides us with ways of thinking that uncover social inequalities and injustices. It enables us to address disadvantage and to become agents of social change.'*
> Tasmanian Department of Education, 2005."

The Math Plague: How to Survive School Mathematics. Sherry Mantyka. MayT Consulting Corporation, 709-579-5879, maytcc.smay@gmail.com. 2007. 134 pages.

This book, an easy read, discusses the math difficulties of incoming students at Memorial University of Newfoundland. The author is the Director of the Mathematics Learning Centre which provides remedial instruction to the many students who fail the university's placement test because their math curriculum had underemphasized drill and precision. Many parallels are drawn with non-mathematical areas of achievement, such as sports and music, showing that high levels of performance require huge amounts of boring, repetitious practice. This interesting excerpt explains why the New England Patriots football team won the Super Bowl in 2002, 2004, and 2005.

Excerpt (pages 25-29)

"The 2001-02 football season was indeed a memorable one for the New England Patriots football team and its fans. The New England team had only made it to the Super Bowl twice previously and had lost both times by a cumulative score of 81-31. Furthermore, the team's last trip to the Super Bowl had been sixteen years prior.

"The season leading up to the AFC Championship title had been a tough one for the New England Patriots. Their $100 million quarterback had been injured early in the season and was not able to return to the game until very late in the season….

"The New England Patriots were the underdog team for most of that season. As they continually defied the odds with consecutive wins following their quarterback's injury, they were tagged the Cinderella team, the team of destiny. The coaching staff was masterful in managing the team's situation. The head coach, Bill Belichuk, was heard repeatedly in interviews following winning games to speak of his respect for his players' commitment to the team and to hard work and repetitious practice of what would turn out to be key plays in many tough game situations that season….

"The analogy with learning mathematics is simple. You may be someone who does not enjoy the drill and practice associated with learning

mathematics. You may not recognize how mathematics will be of any use to you in what you want to do with your life. You may find it takes twice as much practice for you to develop the same level of mathematical competence as your friends. You are a mathematics underdog….

"Developments in cognitive psychology and intervention research provide the rationale for our insistence on the importance of repetitious drill and practice in the learning of mathematics….

"Over the past two decades, cognitive psychologists have proposed a variety of models initially designed to account for errors that occur when people are required to perform two or more tasks simultaneously. In most of these models, it is assumed that some resource (e.g., energy, attention, working memory) is limited. Three ideas which are relevant to mathematics are: (a) capacity limits performance -- mathematical performance will eventually break down as task difficulty is increased; (b) capacity is used in performance – adding more components to a problem (e.g., presenting a word problem rather than simply stating the problem numerically) will use more capacity and increase task difficulty; and (c) demands on capacity are less for individuals who have higher levels or relevant skills.

"This is why we insist that students of mathematics must be prepared to dedicate much of their time learning mathematics to the practice of basic skills in order to be good problem solvers. From the perspective of this research in cognitive psychology, an individual's performance in problem-solving will be maximized if they do. The more attention that has to be given to execution of specific skills while a problem is being solved, the more mistakes will be made.

"This principle is taken for granted in sports but is ignored in modern mathematics school curricula. Coach Belichuk knew that the only way for his team to be able to successfully execute a blocked field goal in a game situation was to practice it over and over again in non-game situations. It is the same brain driving our bodies when we play a sport as it is when we try to solve a problem using mathematics. Why on earth would we expect to be able to circumvent the drill and practice in mathematics when we know we cannot circumvent it in athletics?

The Outrage of Project Follow Through: Five Million Failed Kids Later. Siegfried Engelmann.

Written by the eccentric genius behind the very effective Direct Instruction programs, this book tells the inside story of the largest research project ever mounted, and for sure the largest research project ever totally ignored by educators. Last month, the author displayed his book chapter by chapter on his web-site, but it is unfortunately no longer available on the Internet. This interesting excerpt proves that children's poor learning is almost always due to inadequate teaching.

From Chapter 4

"During the years we participated in Follow Through, I did work on several other projects. One was another experiment designed to discredit Jean Piaget's theory of development. This theory was popular among educators, but it was dangerous because it suggested that critical knowledge could not be taught, but had to be acquired through amorphous interactions of children with their surroundings, a process described as self-regulation.

"The experiment I did involved teaching six at-risk five-year-olds some of the rules they would need to pass various Piagetian tests, including the test of specific gravity, which is generally not passed by children under 12 years old. Like the earlier experiments I did, the teaching was designed to violate every principle that Piaget asserted is necessary for learning to occur. Because Piaget assumed that his principles are universal, one five-year-old passing the test of specific gravity would discredit his theory.

"The instruction for all the topics took a total of three hours (distributed over six sessions). Part of the instruction presented rules about the floating and sinking behavior of objects. There were no demonstrations involving sinking and floating, and no activities in which children manipulated anything – just the rules and verbal examples.

"After instruction, children were tested individually by a recognized Piagetian researcher. We added some items to the standard Piagetian tests so we could evaluate the extent to which children learned generalizable strategies. For example, in addition to the standard Piagetian tests of whether objects will float or sink in water, we added a test involving mercury. Steel balls float like corks in mercury. The tester presented two steel balls, one small and one large. The tester asked whether the smaller ball would float or sink in mercury. After the child responded, the examiner would put the smaller ball in water and ask why the ball floated. The children in the study had been taught that if something floats in a medium, that thing is lighter than a piece of the medium the same size as the object.

"The examiner next asked what the larger ball would do when it was placed in mercury. The children had been taught that if two things are made of the same material they would behave the same way.

"Another test involved a candle. The examiner asked whether the candle would sink in water. Then the examiner proceeded to cut the candle into a small piece and a large piece. She asked about each piece.

"Most of the children passed the test of specific gravity. One of our graduate students was outside the door of the examination room, monitoring the proceedings. When I saw her during the break, she said, "Oh, that mercury test is amazing. After the little steel ball floated in mercury, the tester asked David what the big ball would do, and he said it would float. I knew he was wrong. That big ball is so heavy. But he was right. It floated!"

It seemed that our graduate student did not have a generalizable notion of specific gravity.

"One of our subjects showed great generalizability of what had been taught. Before the examiner cut the candle into two pieces, she asked the girl what the candle would do in the water. The girl said it would sink.

"The examiner started to cut the candle, then stopped and asked what the big piece would do. The examiner started to cut again when the child announced, "'It will float'. The examiner stopped and said, 'First you say it will sink and now you say it will float. What will the little piece do?' (Float.) 'What will the big piece do?' (Float.) 'What will the whole thing do?' (Float.)

"'Why do you now say they will float?' The child pointed to a flake of candle that was floating on the water. 'That piece came off when you cut the candle. It's floating. So the whole thing will float and all the other parts will float.'

"In contrast to the generalizations that the children produced were the responses of Piagetian researchers to a simple (but tricky) problem of conservation. I presented the paper on the experiment at a symposium held in Monterey, California, sponsored by the California Test Bureau and titled, 'Conference on Ordinal Scales of Cognitive Development', which means simply what knowledge emerges first and next, and whether they always have to occur in the same order. The audience consisted of around 200 people. I told the aside about our graduate student not having a generalizable notion of specific gravity, and I pointed out that at least some members of the audience didn't have a generalizable notion of basic logical structures, like understanding conservation of number.

"To illustrate, I presented the following problem. You have two identical glasses, both filled to exactly the same level. One contains whisky, the other water. You take exactly one spoonful of whiskey and put it in the water glass. Then you take one spoonful of the mixture from the water glass and return it to the whiskey glass.

"Question: Is there more whisky in the water glass than water in the whiskey glass? Or is there more water in the whiskey glass than whiskey in the water glass? In other words, the percentage of foreign matter in each glass has changed. Has the percentage changed more in one of the glasses, or is the percentage change the same for both glasses?

"I asked for those who thought the percentage changed more in one glass than the other to raise their hands. Considerably more than half of the people in the audience raised their hands, which means that they did not have logical operations that eight-year-olds are supposed to acquire, according to Piaget.

"I pointed out that this problem is interesting because it presents a situation that is rarely encountered. But if one had an understanding that

liquids are composed of fixed numbers of counters or parts, the answer is simple.

"Instead of water and whiskey, think of red balls and white balls. Each glass starts out with 100 balls of a single color. We remove three balls from the red-ball glass and put them in the white-ball glass. Then we return three balls from the glass with the 'mixture' and put them in the red-ball glass. If we return three white balls, one glass will have 97 red and three white; the other glass will have 97 white and three red. If we return two white and one red, one glass will have 98 red and two white. The other glass will have 98 white and two red. No matter what combination of colors is returned, the change will be exactly the same for both glasses so long as three balls are moved. If a person had a logical operation involving fixed units, the person should have no more difficulty with this problem than our graduate student should have had in figuring out that the big ball should float in mercury.

"Neither my experiment nor the presentation (which was published in the book *Measurement and Piaget),* had any effect on the popularity of Piaget's theories. Educators still felt that if children failed to learn, the problem was largely developmental and could not be greatly influenced by instruction. This was a convenient stance because we can't blame the teacher for a child's poor performance if that performance is supposed to be governed by the child's self-regulatory mechanisms. The child is clearly assumed to be the cause of his failure."

SQE ACTIVITIES

SQE president Malkin has been honoured by the Zonta Club of Kitchener-Waterloo with a woman of achievement award for her volunteer work in the field of literacy.

AND NOW FOR SOMETHING COMPLETELY DIFFERENT

Click here to watch an eagle in real time sitting on her eggs (laid March 5 and March 8, 2007). If you follow the right links, you can watch a video of her actually laying the second egg. The eggs will hatch out after about 35 days.

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