

INTERNATIONAL REVIEW



Quantitative Literacy

In a world drenched in data, we must ensure that students know the meaning of numbers

By Lynn Arthur Steen

Our world is awash in numbers. Headlines report the latest interest-rate cuts by the Federal Reserve, hikes or drops in gasoline prices, trends in student test scores, results of local and national elections, risks of dying from colon cancer, this season's baseball statistics, and numbers of refugees from the latest ethnic war.

Quantitative thinking abounds, not only in the news but also in the work place, in education, and in nearly every field of human endeavour. Anyone who wishes can obtain data about the risks of medications, per-student expenditures in local school districts, projections for the federal budget surplus, and an almost endless array of other concerns.

If put to good use, this unprecedented access to numerical information will place more power in the hands of individuals and serve as a stimulus to democratic discourse and civic decision making. Without understanding, however, access to this information can mystify rather than enlighten the public.

If individuals lack the ability to think numerically, they cannot participate fully in civic life, thereby bringing into question the very basis of government "of, by, and for the people."

Considering the deluge of numbers and their importance in so many aspects of life, one would think that schools would focus as much on numeracy as on literacy, on equipping students to deal intelligently with quantitative as well as verbal information.

Yet, despite years of study and life experience in an environment immersed in quantitative data, many educated adults remain functionally ennumerate. Businesses lament the lack of technical and quantitative skills among prospective employees, and virtually every college finds that many of its students need remedial help in mathematics. Data from the National Assessment of Educational Progress show that the average mathematics performance of 17-year-old students is in the lower half of the "basic" range and well below "proficient." Moreover, despite slight growth in recent years, average scores of Hispanic students and African-American students are near the bottom of the "basic" range.

Common responses to this well-known problem are either to demand more years of high school mathematics or more rigorous standards for graduation. But even individuals who have studied calculus often remain largely ignorant of common abuses of data, and all too often find themselves unable to comprehend (much less to articulate) the nuances of quantitative inferences. As it turns out, it is not calculus but numeracy that is the key to understanding our data-drenched society.

The expectation that ordinary citizens be quantitatively literate is primarily a phenomenon of the late 20th century. Its absence from the schools is a symptom of rapid changes in the quantification of society. As the printing press made literacy a societal imperative, the computer has made numeracy an essential goal of education. Yet practice in our nation's schools and colleges does not reflect that goal. We need, therefore, to broaden our national conversation about education to include careful attention to numeracy.

This conversation must be carried forward first and foremost in school and college settings. If asked, faculty members and administrators at most schools and colleges today probably would say that they intend to produce quantitatively capable graduates. But the typical response, a more intense focus on a traditional mathematics curriculum, will not necessarily lead to increased competency with quantitative data.

This conclusion follows from the simple recognition that numeracy is not the same as mathematics, nor is it an alternative to mathematics. Today's students need both mathematics and numeracy. Whereas mathematics asks students to rise above context, quantitative literacy is anchored in real data that reflect engagement with life's diverse contexts and situations.

The case for numeracy in schools is not a call for more mathematics, nor even for more applied (or applicable) mathematics. It is a call for a different and more meaningful pedagogy across the entire curriculum. In life, numbers are everywhere, and the responsibility for fostering quantitative literacy should be spread broadly across the curriculum. Quantitative thought must be regarded as much more than an affair of the mathematics classroom alone.

Quantitatively literate citizens need to know more than formulas and equations. They need to understand the meaning of numbers, to see the benefits (and risks) of thinking quantitatively about commonplace issues, and to approach complex problems with confidence in the value of careful reasoning. Quantitative literacy empowers people by giving them tools to think for themselves, to ask intelligent questions of experts, and to confront authority confidently. These are the skills required to thrive in the modern world.

Lynn Arthur Steen is a professor of mathematics at St. Olaf College in Northfield, Minn., and led the team of scholars and educators that produced the book *Mathematics and Democracy: The Case for Quantitative Literacy*. The book was the work of the National Council on Education and the Disciplines, an education reform initiative centered at the Woodrow Wilson National Fellowship Foundation in Princeton, N.J.

From *Education Week on the Web* [American Education's Newspaper of Record], Wednesday, September 5, 2001, Volume 21, Number 1, p. 58



Sweden Establishes a National Graduate School in Mathematics Education

By Gerd Brandell

Mathematics education has a tradition as a research field in Sweden since at least the days of the great school researcher Frits Wigforss, who published a number of books in mathematics education starting in the twenties. His books were used in teacher education in Sweden for a long time. Other researchers followed him, but they were and still are relatively few. However, the situation is starting to change. The interest in mathematics education as a research field has been growing strongly during the last ten to fifteen years, and many students now desire to perform doctoral studies. But the area is not yet firmly established as a research field. Few universities offer PhD programs to students interested in doing research in mathematics education.

There is a lack of teachers in mathematics having research training both in upper-level secondary schools and in university departments for teacher education. In every upper-level secondary school, there ought to be teachers in all main areas with a research background. This is the official policy that has a long tradition, but the reality is very different in mathematics. Only very few teachers with a PhD in mathematics are teaching at this level today. The situation is similar among lecturers in mathematics and mathematics education in teacher training departments although not quite as bad.

It is against this background that the Bank of Sweden Tercentenary Foundation in April 2000 decided to fund a national graduate school in mathematics directed towards didactics of mathematics. The meaning of didactics is more general in Swedish than in some other contexts. Its meaning is best translated as 'teaching and learning of mathematics'. The aim of the Foundation is to develop mathematics education as a research area in Sweden and to provide teacher education in mathematics and upper-level secondary school with teachers having a solid research background. The graduate school will fund about fifteen PhD students during five years, which is the normal duration of a doctoral education. The funding will cover the cost of salaries for the doctoral students as well as give some support for supervisors and for developing courses given within the framework of the graduate school. The school will start in September 2001.

The graduate school is constructed as a network, and the nodes will be departments at several universities. The doctoral students will be enrolled at their faculty as regular PhD students. The aim of the graduate school is to strengthen the student group by giving them opportunity to meet and work together. During courses and seminars they will discuss, criticise each other's work and develop their academic skills and understanding of the research process in collaboration. Each course will be based at one of the departments and the co-operation will be supported by communication technology.

Several departments are now developing the structure and content of a PhD program in mathematics education. The PhD programs are developed by mathematicians and specialists in mathematics education in collaboration within mathematics or other departments.

The creation of the graduate school is obviously a great challenge to the mathematics education community in Sweden. The main problem is not recruiting good students. Recent announcements of positions as doctoral students as well as informal contacts indicate that the interest from students is high. The main problem is the lack of experienced and qualified supervisors in the area of mathematics education in our country. One way of backing the supervision and ensure quality is to turn to researchers from other countries. Internationally recognised researchers with extensive supervisory experience will be invited as guest professors to the graduate school for extended periods. They will share their knowledge and experience with the supervisors as well as take direct part in the supervision and in the courses.

The first step in supporting the Swedish supervisors has already been taken. In early December 2000, fifteen academics interested in supervising the graduate school students visited the Department of Educational Studies at the University of Oxford, OUDES, for five days. Professor Jaworski and her colleagues gave the Swedish participants intense and extremely interesting insight into how research training in mathematics education is done at OUDES. The experiences from OUDES will certainly be of great value when programs are formed and applications for the graduate school are prepared as well as later on when the students start their studies.

The graduate school is of strategic importance for the future. The current government policy is to encourage graduate schools as a framework for research education. Such schools are seen as being efficient. If the graduate school in mathematics education is successful it may later receive permanent funding from the government.

The board of the graduate school is appointed by the funding organisation and all its members are former or current members of the Swedish ICMI committee. Professor Wallin, Umeå University, chairs the board.

From the [International Commission on Mathematical Instruction] ICMI Bulletin, December, 2000, Number 49. See

<http://www.mathunion.org/ICMI/bulletin/49/Sweden.html>



Lessons: To Peace on Math's Battlefield

By Richard Rothstein

Few disputes in education are as bitter as those between back-to-basics and teach-for-understanding factions in math. Each blames the other for low scores. Each complains that it has been caricatured by the other.

The back-to-basics group wants more memorising and practising rules for multi-digit addition and subtraction, long division and multiplication. But most proponents of basics also say pupils should know how arithmetic applies to real situations.

The teach-for-understanding side wants more exploration of math problems so children can develop their own insights for solving them. But most proponents of understanding also say pupils should learn the conventional rules.

Yet sometimes when this debate filters down to classrooms, the caricatures become all too real. Many teachers simply drill students in procedures that are soon forgotten. Others expect children to invent techniques that civilisation took eons to evolve. Unsophisticated followers of each camp share the blame for poor math performance.

Into this morass has come a little book, "Knowing and Teaching Elementary Mathematics" (Lawrence Erlbaum, 1999), by Liping Ma, a Carnegie Foundation researcher. Both sides in the math wars claim Dr. Ma as their own. Districts have distributed her book to teachers. Its broad appeal offers some hope for common ground in math education.

Dr. Ma says that, yes, children should learn to apply arithmetic rules fluently, as back-to-basics crusaders urge. But, she adds, Americans often teach the procedures poorly. Students lack proficiency not from inadequate drill but because too many teachers themselves do not understand the mathematical principles behind the rules.

This won't be solved by hiring teachers with more advanced college math credits. Nor will it do simply to demand more pure pedagogical training. Rather, elementary-school teachers need deeper understanding of the superficially simple arithmetic they cover.

Consider a subtraction problem taught to second graders (graphic not shown here - e.g., $62 - 7 = ?$):

Most teachers explain: Borrow a 1 from the tens' place, leaving only 5 tens; then write the borrowed 1 next to the ones' place to make a 12. Pupils can memorise this method, practice and become proficient in it. But with no proper theory underlying the gimmick, children do not learn why they should use it, and develop no foundation for higher mathematics.

Second-grade teachers may engage pupils' interest with an ill-considered metaphor, for example saying that the digits on top in two-digit subtraction are like neighbours, one of whom goes next door to borrow some sugar. Dr. Ma notes that "this arbitrary explanation doesn't contain any real mathematical meaning." Worse, it misleads by suggesting that the 6 and the 2 in 62 are independent numbers, not two parts of one number.

Dr. Ma contrasts this with how teachers in her native Shanghai typically handle the problem. There, the metaphor of borrowing was abandoned in a 1970's math reform. Instead, Chinese teachers speak of breaking down a higher number, explaining that the 6 in the tens' place is actually made up of 60 ones. The number 62 can be regrouped in many ways: 60 and 2 is the same as 50 and 12, 40 and 22, etc.

After this explanation, children can learn the mechanics - putting a line through the 6 and writing 5, putting a small 1 before the 2 to create 12 - in a way that makes mathematical sense.

The difference between borrowing and regrouping may seem small. But regrouping numbers is a basis of higher math (like factoring in algebra). Second graders taught regrouping will understand arithmetic well enough to proceed to more advanced topics. Second graders drilled in borrowing may never make it to algebra.

Dr. Ma's most shocking conclusion is that most American schools don't teach mathematical foundations of arithmetic because teachers themselves weren't taught those principles. Pupils are shown only what teachers know: to do operations by rote, using tricks (like borrowing sugar) to help remember rules.

The solution is not, as some think, to hire teachers who had more college math. The American teachers Dr. Ma observed took more math courses than the Chinese who began teacher preparation after ninth grade.

Rather, elementary schools and teacher colleges alike must offer deeper understandings of basic math. And, Dr. Ma says, teachers need more common planning time to discuss arithmetic lessons and how children comprehend them.

Without such reforms, we will continue fights over whether children should be taught arithmetic rules or theory. What Dr. Ma shows is that we need both.

From the New York Times on the Web, Tuesday, June 27, 2001



It's Time To Get Real About Boys

By Diana Bagnall

That girls consistently perform better at school than boys is undisputed. What is controversial is why - with some educators blaming a feminised curriculum, Diana Bagnall reports on a continuing class struggle.

Buried deep in the transcripts of the ongoing national inquiry into boys' education is this tragi-comic little tale. It comes from one of Australia's most dogged campaigners for a fair hearing for boys and men, Newcastle academic Richard Fletcher.

"There was a school in the Hunter [Valley, NSW] where they were tearing their hair out," Fletcher told the federal parliamentary committee conducting the inquiry. "The principal told me he and the deputy tried to figure out stuff about getting boys involved. They thought, 'What can we do that boys will like?' They decided to get a cadet corps for the first time.

"They contacted the Army and arranged all the bits and pieces. They had their first muster, I think they call it, and the deputy came in and said, 'Come out to the playground, you'd better have a look.' He went out to the playground - this was the first day for the cadet corps - and there were 16 girls and two boys. He had tears in his eyes. I said, 'What did you do?' He said, 'We put the boys at the front so it didn't look so bad.'"

Everywhere, everyone is tearing their hair out about boys' disengagement. It's most obvious in their academic performance. In Australia, in every area of the assessed curriculum, boys are achieving lower standards than girls. In NSW, boys outnumber girls two to one in the bottom 10% of Higher School Certificate scores, and girls outperform boys by up to 11% in the large majority of subjects.

But boys' failure also shows up in juvenile crime statistics, in youth suicide numbers, in early school-leaving rates, all dominated by males. "I think what happens is [boys] dissociate themselves, they disenfranchise themselves, they do not want to be part of what the mainstream is on about, and we are seen to be the mainstream," Gail Armstrong, the principal of Queensland's Marsden State High School, told the boys' education inquiry.

The mainstream in education looks female. Most teachers - around 80% - are women. In NSW, the number of men in primary teaching has fallen in the past five years from 37% to 17%. Very few men are training to be teachers. At the University of Western Sydney, for example, only 3% of early childhood and 14% of primary teaching students are male.

But it's more than just the face of teaching that is female. Some principals and researchers are beginning to talk of a "feminised" curriculum, of assessment techniques being "boy-unfriendly", of teachers being fearful and hostile towards boys and increasingly defining the "ideal student" as female. Meanwhile, parents and teachers, desperate to motivate their sons and students, are floundering in the absence of hands-on guidance and wondering if boys' failure might not be an unintentional by-product of girls' success.

Boys' antagonism towards and disconnection from compulsory schooling isn't exactly a new phenomenon. Shakespeare had a handle on it: "The whining

schoolboy, with his satchel, And shining morning face, creeps unwillingly to school" (As You Like It, II. vii). The difference between then and now is not so much in boys' experience of schooling as in girls'. In Shakespeare's day - and, in fact, until the beginning of last century - no one much bothered about sending girls to school. When girls were eventually allowed an education, the brightest and most ambitious graduated to become teachers. Teaching was one of very few careers available to women until the feminist movement blew the top off society in the 1970s.

When that happened, women were well placed to reshape the education agenda. They took up cudgels on behalf of girls and campaigned hard for schools and curricula to recognise and encourage girls' aspirations and achievements - with spectacular success.

For the past 10 years, girls have dominated the top strata of school-leaving exam results, and in 2000 made up 56% of students starting university. No one but the most pig-headed of traditionalists would turn the clock back. But hang on. What about the boys?

Feminist argument (and in education, feminist argument holds more sway than in any other field) has it that boys are doing fine, that they still win the good jobs and earn more money than girls when they leave school, so what's there to worry about? Reluctance to trigger fresh outbursts of feminist anger has effectively crushed debate

about what Tim Hawkes, headmaster of The King's School in Parramatta, Sydney, calls the "national scandal" of the poor performance of boys relative to girls in academic tests and exams. The silence is now breaking.

In his book *Boy Oh Boy* (Pearson Education), published on June 4, Hawkes talks scathingly of a "feminisation of the curriculum" and its consequences for boys. Physics and mathematics, for example, are having their material rewritten to make them more girl-friendly, he says.

"No one appears to have noticed that in so doing they may be making this material boy-unfriendly. When a physics test loses its distinctive content and merely requires students to write an essay on the life and times of Sir Isaac Newton, one can be forgiven for wondering whether all subjects are slowly evolving into an English exam."

The principal of City Beach High School, Perth, Ian Lillico, told the parliamentary inquiry that the shift in the modern curriculum towards open-ended, reflective tasks from closed, structured, information-dense tasks was the biggest in education. "Many people would call that an effeminised curriculum because that is the way girls traditionally learn," he said.

An important British report published in 1999 by the National Foundation for Educational Research found evidence that girls were better than boys on average at sequential and analytical approaches to learning, and suggested the shift towards this style of learning and retreat from fact-based learning seems to have disadvantaged boys. Lillico considers the most important finding of his Churchill Fellowship research into how boys learn to be that boys "don't think before they act, they do not reflect enough". Our modern curriculum requires a lot of reflection, he told the inquiry, but it was not negotiable because it encouraged skills that people would need in the future. "Those closed structured jobs have changed, and therefore our curriculum has changed."

Leaving boys, it seems, out in the cold. But need they be?

No, according to Hawkes and the man he engaged a year ago as a consultant to The King's School, University of Western Sydney researcher Peter West. West, like Fletcher, has spent many years paddling in what many of his academic colleagues undoubtedly consider a backwater, researching maleness. But if that makes West a wet, The King's School, which has traditionally educated the sons of the squattocracy, is reputedly anything but wet. So what's happening here?

The men are coming out to fight for the boys, that's what. Not with the intention of protracting the gender wars. "There's mutualism in this new cause," writes Hawkes in his foreword to a report by West, released on May 30 by UWS, on best practice in boys' education. "Some have gone into print, warning of the 'backlash' and seeking to dismiss any initiative that might meet the needs of boys as an inappropriate over-correction. But the needs of boys in schools should not be sacrificed on the altar of gender equity."

The new cause as Hawkes describes it, is to understand and promote ways in which boys learn best. If that sounds eminently sensible be prepared for a surprise. Even suggesting that boys may have different needs and learning styles from girls appears to be controversial, hence Hawkes' pre-emptive strike against the backlash.

Fletcher alluded to what's coming when he told the inquiry that "we have underestimated how important the physical is. That goes to the heart of teaching styles and learning styles..."

Hawkes puts it this way: "We tend to teach in the manner in which we prefer to learn. Most teachers are female. Their learning styles lean towards passivity, are heavily literacy-based, and that's entirely understandable. But when you have a large number of female teachers teaching boys, it is entirely possible they are unwittingly teaching in a style they find effective for them but which is fairly wide of the mark for where boys are."

Themes that keep reappearing in West's report revolve around boys' apparently weaker powers of concentration (compared with girls), their disenchantment with "girly" things (including reading), their preference for precise direction and their desire to be active and outdoors. Girls, on the other hand, are eager to please teachers and more successful in get-ting teachers onsite, are better behaved and are more enthusiastic about learning.

West suggests there are two possible reasons for this, not necessarily contradictory. "First, girls have been convinced that education is the ladder on which they will ascend to success; while most boys have not been convinced of the same. Second, schools are more targeted towards girls than they are to boys. If many boys see schools as a nuisance and a waste of time, that is something educators need to be concerned about."

But schools can get boys to achieve, if they set their minds to it, he believes. "Boys' education, like girls' education, can be transformed if there are people willing to transform daily practices and routines."

Both he and Hawkes have come up with road-tested ways for getting the most out of boys at school. West draws on schools' experience in Britain and the US as well as Australia, and his association with The King's School provided him with a "laboratory" in which to test some of the methodology.

His recommendations are practical and, to the lay person at least, hardly rocket science. None involves setting up a cadet corps, though the school in the Hunter Valley was on the right track. Boys do best, he reports, when their learning is action-based, when they have strong role models and male mentors, when their behaviour is monitored, when they are given incentives to do well, when their lessons are structured, and when there's challenge and risk.

He draws heavily on the work of Geoff Hannan, who works out of Viewforth High School in Kirkaldy, Scotland. Hannan, West reports, has shown graphically that, as a result of the way they are raised (girls expected to play with dolls, are cuddled more; boys expected to do things, to act, to play outside), girls typically grow up as natural students while boys typically grow up as a boy first and a poor student second.

The boys in his research typically became more speculative thinkers with experiential learning styles and were often good at subjects involving hands-on (industrial arts, for instance) or physical space (physics). Girls' learning styles were more oriented towards language, based in an interest in people and relationships, and they were natural in English, especially novels and poetry.

Hannan feels most teachers inadvertently favour girls in style and content and has called for a wholesale attack on the idea that teachers talk for 30 minutes and students write notes for 15 or 20 minutes. He suggests teachers give small, focused tasks rather than long, unfocused tasks, and for teachers to make much greater use of relevance and challenge for boys ("Bet I can put 10 of these on the board before you can write them down"). In Hawkes' opinion (and he's not afraid to voice it - "I don't for a moment think that everyone will agree with me but my critics can't deny me my experience"), teaching boys is all about understanding them. First, boys need fences. Second, boys will do anything to be accepted by the herd, and most herds amble at a speed that enables even the slowest to keep up. Third, boys generally admire strength and teachers who are strong will be the ones they remember with genuine fondness.

Let's start with boys' need for boundaries. "If the fences are weak and undefended, the young bulls will break through," he writes. "Asking them not to lean on the fence is about as useless as playing the flute and expecting rats to follow. Unless some behavioural endocrinology is engaged in, such as lopping off a few testicles, bulls will always test fences. If a fence is weak, as behavioural and academic fences can be in some child-centred learning environments, then boys will cross the boundaries of acceptable behaviour."

"A weak fence tells a boy that 'this particular restriction is not thought very important by adults' - I wonder why it's not worth defending - I'll give it a gentle nudge." If someone has taken the trouble to run a little persuasive electricity through the fence or to build a strong fence that will withstand the odd bump from a bull, the boundaries become both known and respected."

In pedagogical terms, what does this mean? A return to slates, quills and regular beatings? No, says Hawkes. It means more teacher-directed education, more regular checking of work done in class and at home and the regular checking of learning through tests and exams, more rules in the classroom and sanctions in place to support them, single-sex classes, high expectations of boys and formal periods of silent work with minimal distractions.

It means tackling head-on the culture of the herd, which says it's cool to be a fool. It's a culture that shows up in various guises in West's review of the research - in boys seeing homework as less useful than girls, being less attentive, being more reluctant to do extra work and having no interest in doing well per se at school but merely wanting to pass exams.

"Boys are rather pragmatic and need to be persuaded of the worth of a thing before they will commit themselves to it," Hawkes argues. He recommends three lines of reply to the question, "Why should I learn?"

First response, "It's an investment" - this works with boys who have enough emotional maturity to be able to work for a deferred reward. The second response, "It's good fun", may take more selling, and is likely to work only with the successful student, the one least likely to be bothering his parents and teachers with the question anyway. And the third, "Because I told you to", is not subtle, says Hawkes, and should not be relied upon exclusively. But there is still virtue in making some things non-negotiable with boys in terms of both their behaviour and learning.

Absolutely central to boys' relationships to schooling is the way they connect to their teachers. Listen to what Christian Bateman, a student at Trinity College in South Australia, told the inquiry about what makes and breaks a relationship with a teacher: "If a teacher is teaching strictly about work, then you start to get bored pretty easily. There is nothing keeping you switched on all the time. You start to try and find something else to do to keep yourself occupied."

"But if you have a teacher who has a sense of humour and is cracking jokes every now and again with the class, it keeps you a bit more switched on. It keeps you thinking about what he is talking about. If you know there is going to be a joke coming along that you can laugh about with the rest of the class, you kind of pay attention more. I think that is important for education because you cannot learn and think if you do not pay attention."

Ken Rowe, of the Australian Council for Educational Research, quantifies variance in school performance as follows: 5.5% is influenced by the school, 35% by the student and 59% by the teacher. Hawkes is more lyrical. "Teachers of boys need to be transformational, dedicated to changing their students, moving them from one state to another. Teachers need to be optimistic, believing that this transformational process is possible."

And getting their hands dirty. Like Dion Locke, an English teacher at Mabel Park State High School, Queensland, where, last year, Years 9 and 10 were divided into boy and girl classes for English and social science. Locke taught two boys' classes. "In terms of their results, it was reasonably successful, and in terms of them being switched on to learning, I think it was quite successful," he says. "It depends on the teacher, I guess. The boys had a good year with me because we were very hands on."

"With the English curriculum, I tailored it as much as I could to cater for the interests of boys. I had books where the boys were the heroes, such as 'The Outsiders,' which is about gangs and so on. When we did film, we went to Movie World and we did hands-on stuff. They wrote film scripts, and we got in there."

Marsden State High's Armstrong admitted to the inquiry that "we probably have not done enough about deciding what it is that really appeals to boys". Educators have made assumptions but haven't been serious about trialling different ways of

teaching boys, of assessing how the curriculum is delivered and whether it works for boys.

Some schools have had a crack at it, she said, "but it is like everything else; you get somebody on staff who is interested in it for a year or two and you do some good work, and then that person gets transferred or whatever and you really are sitting back on your tail."

Which is a pretty ad hoc way to think about educating half the school population. Time to get real about boys, girls.

Tips For Helping Boys Learn

This list isn't definitive. It's the beginning of redressing the balance, of considering how boys best learn, in the context of a system that appears to be working well for girls and not so well for boys. The recommendations are drawn from Peter West's new report into boys' education, which canvases research and school experience from Australia, Britain and the US.

Use mentors: Boys are strongly influenced by peers, much more so than girls. They want to be accepted by other boys and look up to older boys. Strategies include:

- Paired writing sessions, with an older boy or girl encouraging a younger boy;
- Getting a male teaching student to take an interest in one or two boys;
- Bringing former pupils back to school to encourage active reading.

Reflect on school groupings: British research shows boys often underachieve because of the company they keep. Schools could:

- Examine the learning sets in schools;
- Experiment with groupings which exposed boys quietly underachieving.

Introduce more active learning: Boys don't cope well with long explanations and vague instructions. Teachers might use:

- The "Take 5" approach: "Write down five things about Hannibal's battle strategies. Compare with your partner. How many had never been used before?";
- Ending lessons with an activity that sums up the key learning idea: "Tell your partner: what was the most important thing you learned about veins in this lesson?";

Monitor behaviour: The need for strict day-to-day classroom management, combined with outstanding teaching, is consistently emphasised by researchers.

Increase rewards: Boys need more incentives than girls to work well. Schools could review their pattern of rewards for good work, and check with boys on how they would like to be rewarded.

Harness fathers' influence: Research shows boys deprived of a father often suffer academically. Schools should work harder at understanding the roles fathers play and, in the case of divorce, encourage fathers of boys to stay in their children's lives.

Improve literacy: Boys see English as a female subject because it is about personal identity and feeling. English teachers are overwhelmingly female.

Teachers expect boys to be poorer at English than girls, and often follow these expectations. Schools might:

- Assess the reading habits of boys in the danger years, around Years 8 and 9, and use the data to encourage boys;
- Provide a wider range of non-fiction;
- Use older boys to work with younger boys to encourage their reading.

Improve writing and assessment: Most boys feel frustrated by an emphasis on terms such as "Discuss" and perhaps even "Account for" and "Explain". They need to be shown how to provide an argument for a point of view and marshal evidence within ordered paragraphs.

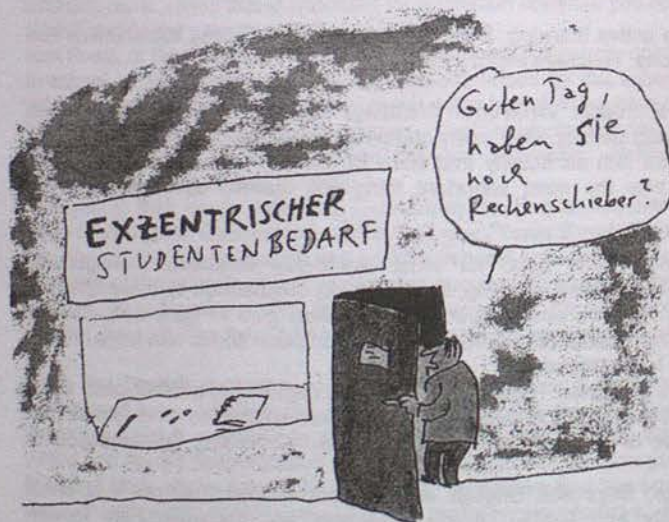
Information technology: Boys often favour learning related to computers.

Increase challenge and raise expectations: Teachers may consider:

- Providing challenges to boys to coax them to respond.
- Expecting boys to take part in music or art or drama.

From The Bulletin [with Newsweek] – Australia – June 5, 2001, pp. 25-28

HUMOR



Zeichnung: Tim Kuhnemann

GDM - Doktorandenkolloquium

Bericht über das GDM-Doktorandenkolloquium 2001

Rita Borromeo Ferri (Hamburg), Meike Grüßing, Petra Lipinski (Oldenburg)

Nachdem im letzten Jahr leider kein Doktorandenkolloquium stattfand, traf sich der GDM-Nachwuchs in diesem Jahr vom 21. bis 23. September im Kloster Benediktbeuern in Oberbayern. Mit Prof. Dr. Kristina Reiss, Prof. Dr. Jens Holger Lorenz, Prof. Dr. Werner Peschek und Prof. Dr. Bernd Wollring standen den TeilnehmerInnen vier ExpertInnen beratend zur Seite.

Es ist wahrscheinlich dem Aufruf auf der letzten GDM-Mitgliederversammlung in Ludwigsburg zu verdanken, dass das Interesse an der Nachwuchsförderung noch einmal verstärkt wurde. So stieß das diesjährige Doktorandenkolloquium sowohl bei Betreuenden als auch bei den Promovierenden und Habilitierenden auf großes Interesse. Aufgrund der begrenzten Unterbringungsmöglichkeiten und aus organisatorischen Gründen musste die TeilnehmerInnenzahl auf 17 Personen eingeschränkt werden – es gab weitere Interessenten auf der Warteliste. Der Wunsch der Teilnahme am diesjährigen Doktorandenkolloquium war also sehr groß.

Um jedem der 17 Teilnehmenden genügend Vortrags- und Diskussionszeit zur Verfügung zu stellen, mussten die Präsentationen der Dissertations- und Habilitationsvorhaben in zwei Parallelgruppen mit jeweils zwei ExpertInnen stattfinden.

Die Forschungsvorhaben waren methodisch weit gestreut. Neben qualitativ und quantitativ orientierten empirischen Studien, wurden auch theoretische Arbeiten vorgestellt. Diese waren auf verschiedenen Schulstufen angesiedelt, wobei tendenziell die Vorträge im Bereich der Sekundarstufen in diesem Jahr stärker vertreten waren, als die im Bereich der Primarstufe. Die thematische Vielfalt zeigt folgende Übersicht:

Themen aus dem Bereich der Grundschule

Elisabeth Rathgeb-Schnierer:
Kinder auf dem Weg zum flexiblen Rechnen: Eine Untersuchung zur Entwicklung von Rechenwegen bei Grundschulkindern auf der Grundlage offener Lernangebote und eigenständiger Lösungsansätze

Meike Grüßing:
Zum Zusammenhang zwischen räumlichen Fähigkeiten und mathematischer Kompetenz bei Grundschulkindern