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September 2000

Regulars

Opinion



Topics of the month

- Should maths be compulsory – or should it be optional beyond the age of 11?
 - Success at the olympics – bad news next time?
 - Maths A-level – how to lose friends and alienate people?
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Have you anything to say on these or other subjects of interest to *Plus* readers? E-mail plus@maths.cam.ac.uk.

Should maths be compulsory?

An educational researcher has proposed that maths should not be a compulsory school subject beyond the age of 11. Dr Steve Bramall, a lecturer in the Philosophy of Education at the University of London, suggests that since most people rarely need more mathematics than basic arithmetic, those who are not interested should not be forced to take the subject further. He says the time saved would be better spent in sociology lessons, where children could learn to make moral, political and personal judgements about what is important.

The argument goes like this: when I need mathematical expertise I don't possess, I can safely consult an expert (a financial adviser, for example); but to put moral judgements in the hands of anyone else, however "expert", would be an abdication of responsibility.

This is an interesting argument, because it does not seem to stop at maths. I could consult a scientist, a historian, a geographer, or a linguist, for information about their subjects. Only in the field of sociology are my own decisions privileged above those someone else makes for me. Taking Dr Bramall's argument to its logical conclusion, it looks as if the whole school curriculum had better make way.

But wait a moment, a historian might object. History is not a matter of battles, names and dates, which can be looked up when they are needed – if they ever are. That is how it used to be taught, and generations of children were bored stiff. But real history, though dates and names may be its raw material, is about evaluating evidence, looking for causes, analysing motives – all essential skills in that process of learning to make decisions for oneself that Dr Bramall is rightly so concerned about.

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The defence of mathematics is structurally similar to that of history. We are sensitive to the similarity because pattern and structure are what our subject is all about, and that is the point. Mathematics is not a matter of remembering formulae to do long multiplication, solve quadratic equations and find areas of triangles. Those may be among its raw materials, but maths is about identifying patterns, recognising structures, investigating the logical consequences of hypotheses. These skills are necessary before anything else when making a decision, passing a judgement, using a computer or reading the news.

For all that, we may have some common ground with Dr Bramall. [Elsewhere on this page](#), a recent A-level student claims that there is not enough imagination in the school maths syllabus below A-level. If that is the view even of a good and interested student, and if others can come away with Dr Bramall's view of maths as "a restricted and limited means of describing and communicating about the world", there is clearly something wrong.

Every day, many children sit in maths lessons which are dull, or which they are not properly equipped to understand. Not unnaturally, they are bored, and the result is that not only do they learn nothing, but they form a negative impression of maths as being nothing but a lot of useless formulae. Dr Bramall's maths lessons were probably like that. But many aren't, and when they are, there are things that can be done.

We need more support for maths teachers, smaller classes, more of the teachers themselves. We need more research into teaching methods, and forums for teachers to exchange ideas about methods and materials. And we need a wider public understanding of maths and its applications. *Plus*, and the Millennium Maths Project, are here to supply some of those needs.

Meantime, we suggest to Dr Bramall a course of study of sociology, that valuable subject for deciding what is important. When he properly has the knack of it, he will realise that one of the things that are important is a good mathematical education.

Maths at the Olympics?

Dr Robert Hunt, *editor of Plus*, considers some new Olympic sports

Great Britain excelled itself at the Olympic Games held this year in Sydney, Australia, with 11 gold medals among its total of 28 gold, silver and bronze. Such an above-average performance may, paradoxically, lead to greater disappointment in future, as simple statistical variations mean that a more "average" performance is likely at the next Olympics: and a decrease in the number of gold medals won is always, wrongly, regarded as a failure. Ask yourself which is better: 11 gold medals this time and 9 next, or 7 this time and 9 next? The former would be bound to provoke congratulations this year but outcries after the next Olympics, whereas the latter would provoke congratulations both times.

More and more activities are becoming recognised as "sports". Ballroom Dancing, long the butt of jokes about fixed grins and sequins, has been officially recognised by the International Olympic Committee, and may shortly become a full Olympic sport. It has, after all, many similarities with ice-skating, in that it requires stamina, artistry and poise. Some people object to such "sports", saying that a true sport has no subjective component: true sports should, according to this way of thinking, be objectively measured in a precise manner, such as the time taken to run a certain distance, or the maximum weight that can be lifted above the head. This would rule out dancing of all kinds, as well as synchronised swimming, diving, and gymnastics. But taken to its logical limit such an approach could rule in some new sports: Olympic Chess, for example, or the time taken to solve crosswords or puzzles. There are already a Chess Olympiad and an International Mathematical Olympiad, as well as Olympiads for other subjects. Perhaps the day will come when the "Mind

Olympics" is a televised event – or perhaps the visual appeal will never be the same ...

Image problem

Dominic Smith recently finished A-levels in Mathematics, Electronics and Physics and will be going on to do a Physics degree at Bristol University. But if you meet him at a party he will tell you he's a photographer ...

You're waiting at the bar of your favourite club, you've left your mates at the dance floor but you need a drink. You've had enough for courage, and as you look around you notice a girl who's looking back at you. Your mates won't notice if you don't find them for a few minutes so you go up and talk to her.

"Hi" you say, with that curious feeling of fear and hope turning in your gut.

"Hi there," she replies, and smiles a beautiful smile.

If you were that kind of person you'd be using all your best chat up lines right now, but instead you offer to buy her a drink, and she accepts.

You begin talking and everything seems to be going well, you like the same music, pubs, clubs, films and she's a student too. But she doesn't know your dark secret. And if the night ends that way you might just see her again. You're just about to pluck up enough courage to ask her to dance or for her phone number but in that brief pause she launches a killing blow.

"So what A-levels did you do?"

The world spins and you know you've somehow been found out, you're an impostor in this social situation, an invader in this land of the elegant and the cool. You could lie, you've thought of it often, but wait, she may understand, you should always have pride in what you do, there is hope.

"I did Physics, Maths and Electronics," you say, slightly sheepishly.

Her face falls, and in sympathy, your heart does. That smile is replaced by a look of incomprehension and repulsion. "God. Er, I could never do something that, er, um, clever." But she doesn't just mean clever does she, she means bright but boring, she begins to fit you into the stereotypes that she's comfortable with. She begins to associate your name with the words "Star Trek".

But before you can recover, gather your breath and think up some witty retort, she is instantly reminded that it's been a while since she saw her friends and how they'll be wondering where she is and it's been wonderful talking with you and she's sure she'll see you again sometime, bye. She'll find her friends, laugh about how she just got chatted up by "a Mathematician!", and dance a little. And perhaps tonight she'll find a really nice, genuine, funny guy. Who probably does media studies.

Anyone who has done maths or any other "brainy" subjects will have seen reactions like this from what seems, on bad days, like most the population. And whilst this stigma is ridiculous we do know some people who it fits cosmetically. Even these people who do look like the stereotype of the bespectacled, badly dressed, unkempt mathematician are seldom bad people and whilst they do sometimes lack social graces they are usually interesting. But what about the majority of us, the social, stylish people with a lot more going on inside their heads than equations and conversations on the true meanings of Fermat's last theorem? We are

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still stuck in this stereotype, simply by studying what we are good at.

But why does such a stereotype exist? Is it some twisted Victorian value that academically gifted people should not be seen to rise above their place? Is it a fear of what people do not understand? Fear of the different? I think what we would all like to believe is that it's jealousy. All bright people have felt alienation due to their abilities, most people have been called a "geek" at some time or other. But beyond the harsh realities of a state secondary school the stigma disappears against almost all subjects. All except Maths.

A few days later you're in a pub with your friends, playing pool. Knowing that you have trouble enough seeing straight at the best of times, you help yourself out by plotting a line from pocket to ball with the shadow of your cue.

"Bloody hell son, that physics b*****s never works!" says your opponent.

With your head motionless, you look up along the line of your cue and catch his eye.

There is a pause. You take the shot, it's good, and as you see the ball sink into the pocket, you retort:

"Tell that to the guy who designed your car."

Perhaps the problem is the lack of perception of the importance of maths and maths-related subjects in society. When people attempt to justify their mockery of mathematicians, one of their most frequent comments is, "Here gov, wot use are all these people who sit around thinking up things that don't exist?" Attempting to explain that to understand the simple scientific principles you must also explain the esoteric usually earns you a blank stare. Everyone wants their car to function and their TV to operate safely but often dismiss this as "Well, engineers are alright, they do useful stuff". And thus engineer is a socially acceptable thing for a bloke to do. But to concentrate on the theory means that you are bookish, weedy, un-masculine and alien.

This brings me to one of the things which I think is a huge pity in Britain today. Until A-level, maths and physics are quite mundane and thus do not appeal to the imaginative and creative student. In consequence, these students do not continue with these subjects at A-level. Unfortunately, many of the students that are left lack the open mind to cope with the esoteric parts of the subject. In my physics set I had a friend who took physics and maths to give him the option of being an automotive engineer. We were studying de Broglie's equation, which is the relationship between the wavelength and momentum of a particle. Amongst other things, this explains how photons (which have no rest mass) may change the momentum of massive particles. He simply could not accept the fact that a massless pool ball could make a massive one move.

One group of people regularly employ the necessary imagination and open-mindedness to be a groundbreaking physicist or mathematician.

We call them artists. And they don't have to lie about their A-levels.

About the authors

Dr. Robert Hunt is the Editor of Plus Magazine.

Dominic Smith recently finished A Levels in Mathematics, Electronics and Physics and will be going on to do a Physics degree at Bristol University.



Plus is part of the family of activities in the Millennium Mathematics Project, which also includes the NRICH and MOTIVATE sites.