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Editorial

The Second Annual Mathematical Gazette Writing Awards

Last year I introduced two awards for mathematical writing, voted for by the readers of the *Gazette*. These were the *Gazette* Article of the Year and the *Gazette* Note of the Year. The awards went to Kiril Bankov for *Some applications of the pigeonhole principle* and Nigel Backhouse for *Pancake functions and approximations to π*. This year similar awards will be made and I urge readers to use the form on the back of the address carrier to vote for the best Articles and Notes of 1996. If the voting form is unavailable, readers may vote by listing their three favourite Articles and their three favourite Notes in a letter. For this purpose, *Matters for Debate* count as Articles. Note that each vote is given equal weight. Voting forms (or letters) should be sent by the end of May 1997 to: **Gazette Poll, 91 High Road West, Felixstowe, United Kingdom IP11 9AB.** The winners will be announced in the July issue.

Why do we teach Mathematics?

I am not sure if student teachers are still invited to justify the place of Mathematics in the curriculum, but in 1980, when I had to write an essay on the subject, it was made quite clear that something more than an appeal to utility was required. As a (former*) Head of Mathematics, this issue arose again for me recently when I was revising the Departmental Handbook in readiness for a school inspection. The point is that we claim to teach Mathematics for a wide variety of reasons, only one of which is its utility [1]. However, some teachers place more emphasis on utility than others, and this is where the arguments start.

Readers of recent issues of the *Gazette* will be aware of criticism of the effects of the unconstrained use of calculators [2, 3, 4]. It seems to me that the utilitarian argument has been over-used in defence of calculators. I have heard it said at various times that students do not need to learn how to multiply two decimals, add two fractions, do long division, calculate a standard deviation, complete the square, or even differentiate a product; because calculators can be purchased to do the job for them. If utility were our only professed aim, these arguments might have some force, but as long

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as we include aims like these:

> 'At whatever level pupils are working the aim should be to enable them to appreciate that there are relationships between the different aspects of mathematics structure.' [5, p. 3]

> 'The aim should be to show *mathematics as a process, as a creative activity* in which pupils can be fully involved, and not as an imposed body of knowledge immune to any change or development.' [5, p. 4]

then we must be very careful indeed before we discard precise, non-calculator methods. Readers may like to try the following one-question test on their students:

What is the value of $(\sqrt{3} - \sqrt{2})(\sqrt{3} + \sqrt{2})$?

The test is failed if students reach for a calculator!

Please don't get me wrong. I am in favour of using calculators in many situations: for example, to speed up work where the calculations may obscure the concepts (such as in trigonometry or 'real' statistics); or to allow alternative approaches to traditional topics (such as using graphical calculators when introducing calculus). My objection is to using calculators to do work which has an essential role in developing the elusive 'feel for number' or which is a stepping stone for algebra. As Tony Fitzgerald warned several years ago [6, p. 10].

> 'But if as the Cockcroft Committee sensibly recommends, schools no longer teach the long division process to most pupils, and, I think the same could apply to long multiplication and the more complex examples of manipulation of fractions, then a vast amount of incidental practice in mental arithmetic will be lost ....
>
> In these long processes, all the constituent calculations are carried out manually, the writing down is merely to record the outcomes in order to carry them forward. If appropriate mental skills are to be developed then alternative ways of doing this will have to be found.'

While I would be comfortable with calculators being used in an investigation of sums of the form $(\sqrt{n+1} - \sqrt{n})(\sqrt{n+1} + \sqrt{n})$ the lesson fails if students are content with the mere observation that the answer is 1. A proof is required – and that moves us on to algebra.

References

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