

## More Than Just a Calculator

This workshop at the 2002 SMC Conference allowed delegates an opportunity to experience using programs on the TI83 that have been written to help students learn maths.

This last point is one that was emphasised. I have spent the last 9 years developing a series of programs that allow students to teach themselves. I have drawn from many sources - old SMILE and SHELL Centre programs for the BBC computer, current educational software for the PC, suggestions from staff in my department and even a few ideas of my own!

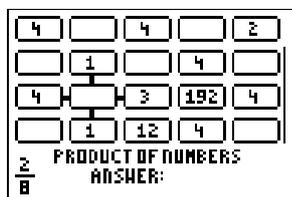
I now have a collection of programs - covering both "core" topics and ones more "off-syllabus" - that can be used with P7 to S6 students

But why have I done this?

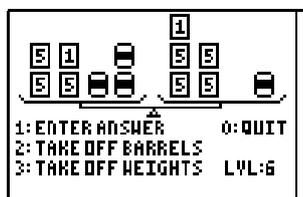
I consider that we are now in the position where handheld technology is widespread enough to be a viable platform for in-class use. Indeed, this is often the easiest way for students and teachers to utilise the power of graphical calculators, compared to the time and skills required to master the in-built capabilities and syntax requirements of the basic calculator.

As a result of the demand in using these programs to deliver the courses that we offer, my department now has 4 class sets of graphical calculators, from TI83's to TI83+ Silver Editions. These have enabled the 13 maths staff to give students the opportunity to progress at their own rate through topics as varied as equation solving, index manipulations, developing understanding of angles and furthering their non-calculator skills, to name a few. This last one is the most ironic - they use a program "The Ultimate Non-Calculator Challenge" which presents them with varying levels of difficulty of calculations involving integers, fractions, decimals and percentages - yet they can't use the calculator to solve them! With over 1200 distinct levels, there is a place for everyone to start....

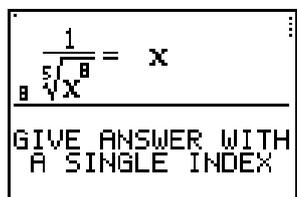
There are many more aspects of the curriculum that can be addressed through this sort of small software - please glance at the various screen shots on this page to see a sample.



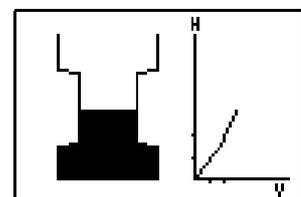
*GridRush number challenge*



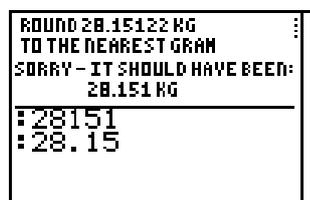
*Equations tutor*



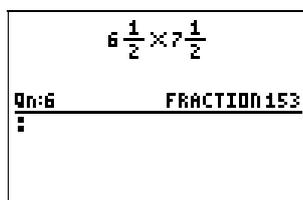
*Indices tutor*



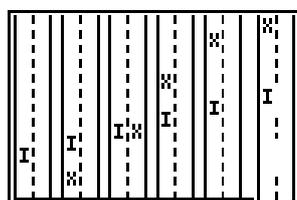
*Jug filling graph tutor*



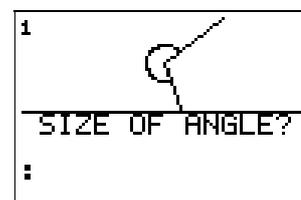
*Rounding tutor*



*Ultimate Non-Calculator Challenge*



*Distance-Time graph animations.*



*Angles tutor*

Every one has been used with great success in classrooms on a regular basis and as a main resource for delivering whatever topic it addresses. This is an important status for such programs - they are not something that is done *as well as* textbook work, but often *instead of* normal routine work. The students enjoy using a different resource that's not confined to an end-of-week, or end-of-term, "fun" lesson.

Indeed, BECTa recently conducted research in Wolverhampton schools on the impact and use of some of the already mentioned programs, plus other similar software on other makes of calculator.

A lot of positive feedback was given, plus an interesting observation: when students are tackling questions that have been randomly generated by the calculator, their discussions with their neighbours were not on what the answer should be, but on how to get the answer - they were focusing on the *method*, not the *outcome*. How often has this not taken place when doing questions from a textbook....?!

But what of the technical side of things?

A school computer network requires IT Support staff and a set of calculators is no different. Whilst I am not advocating that everyone ought to have the skills to program, through the use of such programs the user develops a knowledge of how the RAM and ARCHIVE memories work on a TI83+/83+SE.

With this understanding in place, the only regular maintenance required is the changing of batteries and possible re-sending of programs from one calculator to another as a result of curious students going behind the scenes..... Even so, if a calculator refuses to work in a lesson, it's an isolated machine and can easily be exchanged for one that does work, allowing the teacher or student to continue. The problem can then be sorted out later. Can this quick swap be done with a PC or an iMac that isn't behaving in a computer room?

Delegates of the SMC Workshop were given the opportunity to obtain the full collection of programs for use in their classrooms to allow them to experience for themselves with their classes the benefits that such small software could bring to their teaching.

I am continuing to develop this sort of resource to further support the work done in my classroom and department. At our school, we already have several students who own their own calculators, who request copies of programs to help them revise and become better at maths. The non-threatening and, in many cases, the non-writing-in-a-jotter (!) nature of the programs is one which I find students are more than willing to engage with!

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