The importance of being accessible: The graphics calculator in mathematics education


Abstract

The first decade of the availability of graphics calculators in secondary schools has just concluded, although evidence for this is easier to find in some countries and schools than in others, since there are gross socio-economic differences in both cases. It is now almost the end of the second decade since the invention of microcomputers and their appearance in mathematics educational settings. Most of the interest in technology for mathematics education has been concerned with microcomputers. But there has been a steady increase in interest in graphics calculators by students, teachers, curriculum developers and examination authorities, in growing recognition that accessibility of technology at the level of the individual student is the key factor in responding appropriately to technological change; the experience of the last decade suggests very strongly that mathematics teachers are well advised to pay more attention to graphics calculators than to microcomputers.

There are clear signs that the commercial marketplace, especially in the United States, is acutely aware of this trend. It was recently reported that current US sales of graphics calculators are around six million units per year, and rising. There are now four major corporations developing products aimed directly at the high school market, with all four producing graphics calculators of high quality and beginning to understand the educational needs of students and their teachers. To get some evidence of this interest, I scanned a recent issue (April 1995) of The Mathematics Teacher, the NCTM journal focussed on high school mathematics. The evidence was very strong: of almost 20 full pages devoted to paid advertising, nine featured graphics calculators, while only two featured computer products, with two more featuring both computers and graphics calculators.

The main purposes of this paper are to explain and justify this heightened level of interest in graphics calculators at the secondary school level, and to identify some of the resulting implications for mathematics education, both generally, and in the South-East Asian region.

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Mathematics is a methodical application of matter. It is so said because the subject makes a man methodical or systematic. Mathematics makes our life orderly and prevents chaos. Certain qualities that are nurtured by mathematics are power of reasoning, creativity, abstract or spatial thinking, critical thinking, problem-solving ability and even effective communication skills. For explaining a topic in mathematics, a teacher should take help of pictures, sketches, diagrams and models as far as possible. As it is believed that the process of learning is complete if our sense of hearing is accompanied by our sense of sight. Open-ended questions should be given to the child to answer and he/she should be encouraged to think about the solutions in all possible manners. Still, too few secondary school mathematics teachers are comfortable using graphing calculators or know how to use them effectively for classroom instruction. Although the graphs can be obtained from computer spreadsheet technology, students must recognize the importance of being familiar with handheld technology as well. We want our teacher candidates to be capable and experienced with various technological tools so that they are comfortable using the technology available to them in the schools in which they will be teaching.