

Interactive Computer Software in College Algebra

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ABSTRACT

An interactive instructional computer software model is offered to students in an open classroom setting. This setting provides alternatives to lectures and traditional text books for delivering instructional materials. Class materials are presented in StudyWorks files. The use of this type of technology encourages conceptual learning rather than the rote use of formulas and algorithms. It engages students actively in the material and encourages student experimentation.

Purpose

Technology has revolutionized almost all aspects of our information age, and is becoming a major factor at every level in education. In the mathematics community, there has been growing recognition among educators that technology will continue to develop as a very prominent feature. According to the *Curriculum and Evaluation Standards for School mathematics* (NCTM, 1989), computers should be available to all students in and out of the classroom. Technology, especially the use of interactive computer software, like StudyWorks, is ideally suited to satisfy this recommendation. It is an excellent device for the teaching of mathematical ideas as well as a powerful tool for students to explore mathematical ideas and real-world problems.

Initiative

As a part of the efforts to address this problem of the use of technology, especially computers and computer software in the classroom, the Department of Mathematics and

Computer Science at Georgia State University decided to initiate the use of instructional computer software in four course sections of college algebra. The goal was to implement this aspect of mathematics education reform with the hope that it would have a positive effect on students performance.

Course

During the Winter quarter 1997, a new course for college Algebra students was offered for the first time. Math 104 with interactive computer software is designed to effectively integrate technology in the teaching and learning process. In this course, interactive computer software and pedagogical models are used in an open classroom setting. During class, students work in small groups of three with the instructor acting as a facilitator. Rather than traditional teacher centered lecture methods, class material are presented in StudyWork files. These files contain text, computations, equations, and graphs. The computations, equations, and graphs are “live” making the classroom more active and exciting.

Interactive Computer Software

The StudyWorks lessons are exploratory, leading the students to discover facts “by themselves”. Students are able to get personally involved in experimentation and visually discover important concepts by doing the necessary work. The use of the computer with the StudyWorks lessons helps to create an interactive learning environment in which students are more likely to construct their own mathematical understanding. What was once a passive atmosphere is now a more active one.

Subjects

The participants consisted of students enrolled in the undergraduate program in which the students were required to use the StudyWorks files furnished by the instructor. The students were allowed to use these files in and out of the classroom. The concentration would be on the mathematics involved, not on the software being used. The use of computers to present material to small groups of students provides several benefits. Students learn how to work with others in their groups and learn how to explore questions that occur to them. The course was designed to implement the use of the computers as a visualization tool in the college algebra classroom in order to meet the needs and purposes of today's students.

Results

The statistical analysis of the data from Winter quarter 1997 of this study revealed that the use of interactive computer software in the classroom was very positive. These results had a great impact on students who were struggling in the traditional lecture format. Students success ratio was very high as well as their overall attitude of mathematics.

Because of these positive results from this initial study, the department decided to continue offering college algebra with computer interactive software. Also, with the recommendations from the course instructors and with the revisions of the StudyWorks lessons, this course has been replicated for the last six quarters. The statistical results continue to indicate that students were very involved in the learning process and that the material aided their comprehension of mathematical concepts and problem solving abilities. The overall results from these six quarters can be viewed as another step

towards the applications of technology in the mathematics classroom. The implications of interactive computer software are reshaping methods for teaching and learning.

Semester Restructure

The University converted to semesters this Fall. This change has restructured the courses offered at the University to meet the new academic calendar. College Algebra with interactive computer software has been reorganized to meet these changes. The structure and topic content of the course remains the same, however, the class material in the StudyWorks files are presented in smaller chunks to the students. Students will be given smaller amounts of material in each lesson thereby giving students a longer period of time to master the material being presented.

Conclusion

In general, research on incorporating computer technology into the mathematics curriculum has shown many positive results. The use of technology in the curriculum has enriched students' understanding of mathematical concepts, increased their problem solving abilities, and improved their attitudes towards mathematics. The results of this year long study has also produced the same type of results.

In addition, there are other advantages which arise from the use of interactive computer software. It provides students with the opportunity to interact visually with mathematics in ways never experienced before in their education. It allows the students to explore and solve more real-world problem situations. It allows for more time to be devoted to the development of higher order cognitive abilities, such as problem solving and conceptual understanding.

Technology is a major factor in all areas of the academic world. The use of technology and interactive computer software in the classroom is here to stay. Therefore, we need to capitalize on its power and on its potential for improving our students' mathematical experiences.

References

National Council of Teachers of Mathematics. (1989). *Curriculum and evaluation standards for school mathematics*. Reston, VA: Author.