Games/Drill and Practice in Grades 6-8

Re-published with permission from American Institutes for Research
Games/Drill and Practice in Grades 6-8

By: Center for Implementing Technology in Education (CITEd)

Can students improve their mathematics achievement by using computers and software programs in the classroom? The following examples of research address three of the five content standards recognized by the National Council of Teachers of Mathematics (numbers and operations, algebra, and geometry) and, taken together, the evidence in the articles suggests that the following approaches may work for improving mathematics achievement for students in grades 6-8.

Computerized drill and practice

Bahr & Reith (1989) conducted a study with 50 underachieving, mixed socio-economic status students with learning disabilities who received special education and related services. The study compared the students’ math achievement after they participated three times per week for three weeks in either a computer-based drill and practice intervention, instruction using arcade-style games like Math Blaster, or traditional non-computer-based instruction. Mathematics achievement was measured using multiplication tests and the findings were mixed. In one school, mathematics performance was the same for each group after the three-week period; in another school, students in the instructional games condition did better than students in the computerized drill and practice condition. In a third school, students in both the computerized drill and practice condition and the instructional games condition did better than students in the traditional instruction condition, but mathematics achievement was better for students in the instructional condition than the computerized drill and practice condition. These findings suggest that instructional games and computerized drill and practice are promising for the classroom, but it should be noted that the study had a flawed design, which may have affected the findings.

Christensen & Gerber (1990) also studied the effects of computerized drill and practice on mathematics achievement, but in this case, all students worked on the computer. In their study, 30 general education students and 30 students with learning disabilities of average and underachieving ability levels participated in one of two groups for six
minutes per day for 13 days. The first utilized computerized drill and practice that was embedded in computerized games such as *Alien Addition*; the second engaged in standard drill and practice on the computer (no arcade graphics or sounds). Mathematics achievement was then measured with performance on basic addition facts that used addends of one through ten presented three ways: in a timed written addition test, an oral addition test with questions on the computer, and a keyboard addition test. The authors' results were very clear for students with learning disabilities—performance was better on the standard drill and practice program than the game-like drill and practice program, suggesting that distractibility can be an issue. For students without disabilities, written test performance was better for students who participated in the standard drill and practice program than the game-like program, and there were no achievement differences between the conditions on the keyboard and oral language tests.

Okolo (1992) wanted to find out whether students' preferences and mathematics achievement were different when they participated in either a computerized drill and practice program or a traditional non-computerized drill and practice program. Students with learning disabilities participated in nine 20-minute sessions each week in either the computerized or non-computerized drill and practice program. The students' attitudes towards mathematics were measured with a survey, and their mathematics achievement levels were measured with a test designed to assess automatic retrieval of facts. Although both groups' mathematics achievement improved, motivation was slightly higher in the computerized drill and practice condition.

**Computerized games**

In a study that looked at computerized games and students' mathematics achievement, *Malinow & Black (2003)* studied how 11 students with learning disabilities attending a private school performed on a test of conceptual and procedural proportion word problems after participating for one day with a computer program called *Proportion Power*. The computer program is an interactive, web-based program designed to teach proportion problems. The authors found that less advanced students increased their procedural knowledge after using the program, whereas more advanced students increased their conceptual knowledge. It is
important to note, however, that the intervention was of limited time (one day) and the findings are not based on a rigorous research design.

References


Malinow, A. & Black, J. Integrating a multiple-linked representational program into a middle-school learning disabled classroom. Proceedings from the 2003 International Conference on Computing in Education sponsored by the Asia-Pacific Chapter of the Association for the Advancement of Computing in Education (AACE): Hong Kong.