

## Can Computers Tutor Students As Effectively As Teachers?

### Yes

One of the most famous research results in the Instructional Technology field showed that in study after study, student achievement from computer-aided instruction equaled achievement from teacher-led instruction. For struggling students, computer-aided instruction may be even more beneficial than teacher-led instruction. The instructional delivery medium has essentially no bearing on student achievement.

Far from being a crutch that ultimately ill serves students, instructional software delivered by computers can actually motivate them. Granted, too much of a good thing can be detrimental, and instructional methods are no exception. Whether faced with a steady barrage of teacher talk or instructional computer screens, student motivation will diminish. As instructors, we do well to take notice of Keller's famous research on the ARCS model for motivational instruction. Briefly, instructional software and



**Ken Luterbach**

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Computer programs have graduated in complexity, allowing many adjustments and iterations as students complete tutorials. In a toolbox of instructional strategies for struggling students, computer programs can be valuable and motivational. They can analyze student answers and then modify instruction as needed. However, computer programs cannot take the place of teacher instruction. A teacher satisfies student needs for connections to others, challenges them beyond expectations, promotes high-level and collaborative learning, and can adjust to student personalities and learning styles.

Students need to connect with others. Student feedback to online courses always includes comments such as "I communicated with my online teacher much more than in face-to-face classes." Struggling students especially need to feel connected to teachers and students. As a classroom teacher in at-risk schools, I worked very hard to know students and their parents. I went to the students'



**Jeanie Cole**

teachers are likely to motivate students if the instruction captures student *attention* (perhaps by using a paradox or a challenging question); is *relevant* (that is, strikes the learners as worthwhile); increases the *confidence* of learners (by progressing from simple to complex tasks); and provides *satisfaction* (in part by offering a variety of instructional presentations and tasks).

So why not just let computers tutor students if computers are as effective as teachers? In addition to the need to vary instruction, managing groups of people—especially children and teens—demands human attention. The argument that computers tutor students as effectively as teachers is much narrower than the claim that computers should replace teachers. The equality of instructional effectiveness claim is justified by results gleaned from numerous media comparison studies. In research

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comparing student achievement after engagement in traditional teacher-led instruction versus computer-based training, the learners achieved essentially the same scores whatever their ages and whatever the instructional objectives. The one exception was that struggling students performed a little better with computer-based training than with teacher-led instruction. The suggestion that computers may be limited to helping learners acquire basic skills may seem alluring to anyone who favors human tutoring. However, numerous studies have supported the finding of no achievement difference whatever the instructional objective.

Computer tutoring provides individual attention, immediate feedback,

and unending patience. Further, using computers in this information era bodes well for learners. Lastly, anyone who still believes that computer tutoring is inferior to human instruction should consider surgical simulation software and simulated pilot training, both of which offer benefits beyond human instruction. Additionally, as we proceed further into this information era, we should keep our eyes on improvements to tutoring software, especially the use of autonomous conversational agents.

*Ken Luterbach is an assistant professor in the Department of Library Science and Instructional Technology at East Carolina University in Greenville, North Carolina.*

sporting games. I praised students to parents and administrators, and took an interest in them. With this support, students worked very hard—sometimes progressing several grade levels. We used computer programs to tutor and reinforce learning, but students responded best when I was an active part of computer instruction. They liked receiving compliments and feedback as they worked.

Struggling students respond best when their instruction is adaptable and challenging. They can be instructed in gradual steps, including reinforcement, but sometimes they need to be challenged at a much higher level. My struggling fifth grade students walked past a special class for gifted students each day, pausing to watch as the class completed its fun, collaborative projects. One day, I closed our door and announced:

“We’re going to do things differently in here—we’re going to do everything

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the gifted class is doing,” I said. “But, it’s going to take a lot of work from you.”

My students cheered—and started carrying home all their books to catch up. Soon, they were working on-level and busy with challenging project-based learning.

Working with others motivates students. Many schools require collaborative projects in each grading period. By allowing groups of students to pose questions and solve problems, they reach higher levels of instruction.

Teachers adjust to student personalities and styles of learning. For example, teachers can provide hands-on activities and visual resources to address student needs. Teachers provide games, physical movement, posters,

video clips, and other strategies as needed because so many students are tactile or visual learners.

As tools, computer programs provide an excellent resource for tutoring struggling learners. They can motivate, and students love to work with them. However, we can’t overlook the human aspect. Students need teachers to provide connections, challenges, and adjustments in the classroom. Students also need to be able to connect with one another. For these reasons, computers alone can’t provide a complete learning system, although they are valuable as classroom tools.

*Jeanie Cole is an instructional technology specialist for the Harris County Department of Education in Houston, Texas.*