Classroom computers boost face-to-face learning

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Computers have been used for years to facilitate learning at a distance. A new European research programme shows that computers can also enhance collaborative, face-to-face learning and problem solving.

In recent years, computer-assisted face-to-face collaboration has become an important part of the workplace, under the rubric of computer supported collaborative work.

An EU-funded research initiative called LEAD (rhymes with seed) has now shown that students, too, can solve problems, master subject matter, and learn to collaborate more effectively when their face-to-face communication is enhanced by specific software tools.

That is important, according to LEAD coordinator Jerry Andriessen, because individual learning and problem solving alone do not prepare students adequately for the interactive and collaborative settings they will encounter later in life.

“You have to learn to collaborate effectively with other people,” he says. “When you do, you can get much better results.”

CoFFEE for the students

The primary software tool that the LEAD team created is called

CoFFEE, for Collaborative Face to Face Educational Environment.

CoFFEE, which is now freely available as open-source software, is designed to be easily installed on any local area network, for example a school's computer lab or any computer-equipped classroom.

Because CoFFEE is designed to foster communication and problem solving in class rather than learning at a distance, it does not require an internet link. It is designed to be simple to download, set up and use.

Typically, students use CoFFEE as part of a structured, face-to-face problem solving challenge. The students are in the same classroom and can talk to each other, but each student also has a computer running the CoFFEE interface.

Andriessen says that students quickly learn to switch naturally between verbal exchanges and computer-enhanced interactions.

Real-life example

He offers the real-life example of a group of nursing students asked to develop a care plan for a patient.

"In the past," says Andriessen, "it would be typical for one student to do most of the work, and for there to be very little interaction and collaboration."

CoFFEE, however, boosts cooperative problem solving through a suite of tools that help each student to analyse and understand the problem and make sure that every student has the opportunity to contribute to its solution.

The nursing students are asked to develop a nursing plan based on a

patient's symptoms and their possible causes, and to discuss each other's solutions, says Andriessen. "In contrast to the older approach, everyone has to work and contribute."

CoFFEE's two primary tools for students - a discussion manager and a visualisation interface - complement each other by fostering clear verbal communication and clear visual representation of the problem and its solution.

The "dynamically categorised discussion tool" provides all the students with an organised record of the group discussion.

A teacher can structure the discussion by defining categories ahead of time. Or each student can categorise contributions in an intuitive way. For example, one student might organise comments by symptoms, diagnosis, and treatment plan, while another might use categories such as problems, medications, therapies and outcomes.

CoFFEE also goes beyond ordinary face-to-face conversation by letting students participate in and keep track of several discussions at the same time.

The discussion tool is paralleled by a visualisation tool. This helps students create a shared two-dimensional visual map of the problem and its solution.

Nursing students, for example, might divide the screen into boxes identifying problems, link problems to specific signs and symptoms, and then use arrows to match treatments to desired outcomes.

"Now that they can read what the other students have written and see what the other students are seeing, each student gains a lot of concrete information, and that helps all of them arrive at better solutions," says

Andriessen.

The students can also use other CoFFEE features, including private notes, one-to-one chat, file-sharing, and a shared writing tool to help them compose a joint report or other text.

A voting tool lets students compare their current stance on any issue, for example the proposed treatment plan.

Nursing teacher and educational consultant Astrid Broeker, at ROC Mondriaan in the Netherlands, compared students who were asked to develop a nursing plan with or without CoFFEE. She found that CoFFEE stimulated students to analyse the problem more carefully, seek more information, produce better plans, and learn more than students in normal face-to-face groups.

“Students must offer good arguments to change the minds of other students,” says Broeker. “To find those good arguments, they have to think and reason about each issue very clearly.”

Broeker also found that CoFFEE made students think and communicate not just about the content of the problem but about the problem-solving process itself. Many of them became more confident that they could solve problems on their own and help others.

CoFFEE has also been successfully tested in secondary schools and in some universities and business settings.

CoFFEE plus Tatiana for teachers

CoFFEE provides a simple interface that allows a teacher to plan a lesson or problem solving session in advance, and control it as it unfolds.

Teachers can create learning sessions either by inserting new subject matter into a pre-existing lesson plan, or by building a new learning experience from scratch.

According to Andriessen, a teacher does not need to know a lot about computers to start using CoFFEE effectively with the help of ready-made lesson plans. However, CoFFEE makes even creating completely new lessons relatively easy.

“If you’re able to make your own PowerPoint presentation, you can do this as well,” he says.

In addition to planning and structuring a learning experience in advance, teachers can use CoFFEE to monitor multiple discussions, transfer students from one group to another, and move discussions from stage to stage.

The LEAD team have provided educators with two sets of tools to review, assess and analyse CoFFEE-driven learning experiences.

Within CoFFEE, teachers can reload, rewind, and replay each session to see how a discussion progressed, evaluate each student’s contributions, and identify problems.

“This is a great advantage,” says Broeker. “The teacher can have a helicopter view over the learning process, see what’s happening, and do more specific interventions.”

For even more detailed studies of the learning process, LEAD researchers have developed a software package called Tatiana. Tatiana provides tools for annotating, categorising, filtering and analysing CoFFEE-generated discussions in order to produce information that educational researchers could use.

Andriessen is excited by what CoFFEE can bring to a classroom, and eager to see it used more widely.

“CoFFEE really does a lot of things that other educational tools can’t do, and we’ve seen new and more efficient forms of collaboration emerging when we use it,” he says. “I’d like educators everywhere to use it and give us feedback from what they learn.”

The LEAD project received funding from the ICT strand of the EU’s Sixth Framework Programme for research.

More information: www.lead2learning.org/

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