

New app lures kids into the maths gym

The struggle between parents and children over computer games versus homework appears to have been resolved, at least for primary school maths.

Numbeat, a new maths game that has just been released as an app, is built on the principle that children can enjoy the challenges and achievements of playing shoot-the-baddie games without noticing that they're honing arithmetic skills and building a permanent knowledge of mathematical principles.

"Most computer-based maths games are really standard maths problems dressed up with bright colours and graphics," says ECU psychology lecturer Professor Craig Speelman.

"This is first and foremost a game, which challenges players to beat the clock and gives them an adrenalin charge as it gets more and more demanding.

"It doesn't replace the classroom teacher, but it does exercise newly-learned maths knowledge in much the same way that gym routines build muscle and fitness, and it's a lot more fun than the old-style rote learning of basic maths facts."

Like all dedicated educators, Craig has watched with dismay as Australian math students have sunk through the OECD rankings from 6th in 2000 to 19th in 2012.



A 2006 report by the Australian Bureau of Statistics found 53 percent of Australian adults were functionally innumerate, meaning they would struggle to understand a bank statement or make basic financial decisions.

"Mathematics and numeracy remain an important part of education, but as more and more subjects and options have been crowded into the curriculum, the time teachers have to practice maths has diminished," Craig says.

"The things that kids find boring, like maths drill or mental arithmetic, are those that teachers would be most likely to cut back on so they can get on with the lesson.

"Inevitably some kids will get left behind and find the next step insurmountable, at which point they might decide that they just can't do maths.

“Numbeat has been designed to help them keep up, by giving them that practice time wrapped up in an enjoyable experience.”

The game’s design has not been developed intuitively, but on the basis of researched principles of skill acquisition identified by Craig and his research colleagues.

“It’s quite clear that practice leads to faster performance,” he says. “This is because the more you practice something, the more efficient the brain becomes in accessing the knowledge you need, once you’ve obtained that knowledge.

“This increased efficiency lowers the demand on working memory, in somewhat the same way that a trained muscle needs less oxygen to do the same task, and you then have spare capacity to move on to more complex problem-solving.”

Mastery is achieved when the brain can draw efficiently from an array of knowledge components applicable to the task being undertaken, or which can be adapted to them. This works best when children have the time to master simple skills and to practice applying them to increasingly complex problems.

In Numbeat, for example, the simplest level will give a child time to load 12 doses of medicine into a syringe to kill off 12 germs. As the game progresses, there will only be enough time to load three capsules each containing four doses to get the baddies before they infect the goodies.

The game was funded by the Association of Independent Schools, and tested in four primary schools on 130 students playing

for up to 30 minutes a day over a two week period.

“We found that even from this brief trial, the speed with which they could successfully take a standard maths test increased by five percent,” Craig says.

“We’ve now started a larger trial in better conditions than an active classroom, controlling the time they spend on each session and running over a longer period.

“The computer-based version of the game, which we developed first, has inbuilt monitoring programming that a teacher can use to check on each child’s progress. If someone in the class is having problems moving up from one level to the next with the rest of the class, the teacher can quickly identify the student and find out what the problem is.

“That’s generally not possible in a busy classroom of 20 to 30 students, where the teacher won’t have time to check individual progress frequently.”

The iPad app version has been accepted by Apple and is available for download at \$5.49.

“I think there’s a lot more that can be done with this game,” Craig says.

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