

# Laboratories offer virtual experience

Digital experiments save time and money and provide valuable practice, writes **Joanna Mather**.

At first, lecture notes went up on the internet. Then academics started podcasting lessons and students were able to attend tutorials online. Now universities are breaking down one of the final barriers to truly flexible degrees – laboratory work.

Experiments are going digital and disciplines such as pharmacy, medicine and engineering are leading the way. The virtual lab can be whenever or wherever is convenient," says Matthew Cheesman, an associate lecturer in the School of Biomedical Sciences at the University of Queensland. "All you need is a computer and an internet connection."

Cheesman and his colleagues are building a computer program that will allow students in medicine and science to practise injecting a drug into animal tissue before replicating the experiment in real life.

"Students will open up the program and on their screen will be a lab bench with equipment on it," Cheesman explains. "They can click on equipment and manipulate things on the bench to make samples, which they can then test."

Flexibility for students isn't the only advantage of virtual

laboratories. Physical laboratories are expensive to run. They require specialist staff and contain costly equipment and materials.

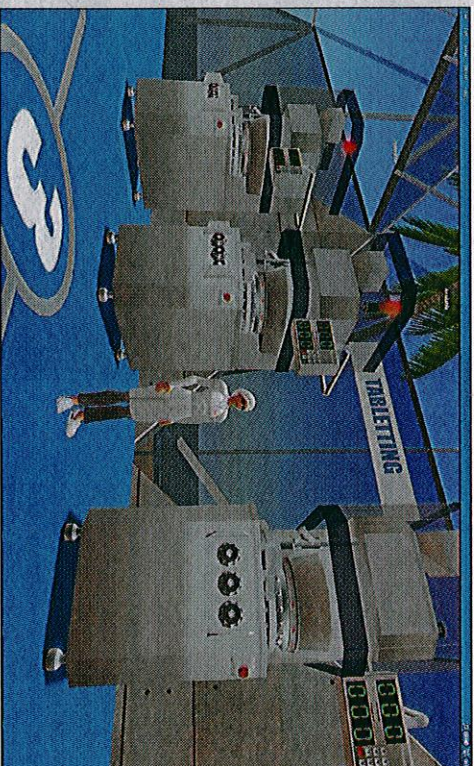
"In the virtual lab, students can do things over and over again as much as they need as a training tool," Cheesman says. "Then when they come to the real lab they are more confident and can do [the experiments] more efficiently."

Elsewhere, computer-based simulations are replacing the in-situ laboratory experience altogether. Monash University has developed a simulation called *Pharmatopia* for pharmacy students, who see themselves as avatars and use their keyboards to formulate and test tablets.

"The students enjoy it because it's something different," *Pharmatopia* creator and senior pharmacy lecturer Ian Larson says. "From the university's perspective, the learning outcomes are much better defined and the administration people like it because of the cost savings," he says.

It might sound like students are missing out on a hands-on approach but manufacturing has replaced tablet-making as something everyday pharmacists have to do, Larson says. "The only reason the university continues to teach the process is because it delivers important lessons about active and inactive ingredients, he says.

These ideas can equally be learnt in a simulated environment, Larson



**Pharmatopia allows students to formulate and test tablets in a virtual lab.**

adds. But it takes less time – what was a 12-hour laboratory class now takes about an hour – and resources can be redirected to other more contemporary applications.

*Pharmatopia* has been so successful that major drug manufacturer GlaxoSmithKline has signed an agreement to use the virtual learning space to train its own staff globally.

The health sciences have been obvious candidates for the take-up of simulation exercises, be they conducted in the virtual or physical world. Paramedic and nursing students use sophisticated mannequins as proxy patients upon

which they can practise everything from the taking of blood to treatment for heart attack.

Virtual laboratory pioneers such as Cheesman foresee a time when trainee doctors can practise heart surgery in a simulated environment before going to work on the real thing. Cheesman says the possibilities for education are endless and will increasingly extend beyond health to other disciplines.

Web-based laboratory experiments are increasingly popular in engineering too, and the University of Technology, Sydney, has been a leader in the field. The difference is that students do not enter a

simulated environment, they use remote internet access to manipulate real equipment on campus.

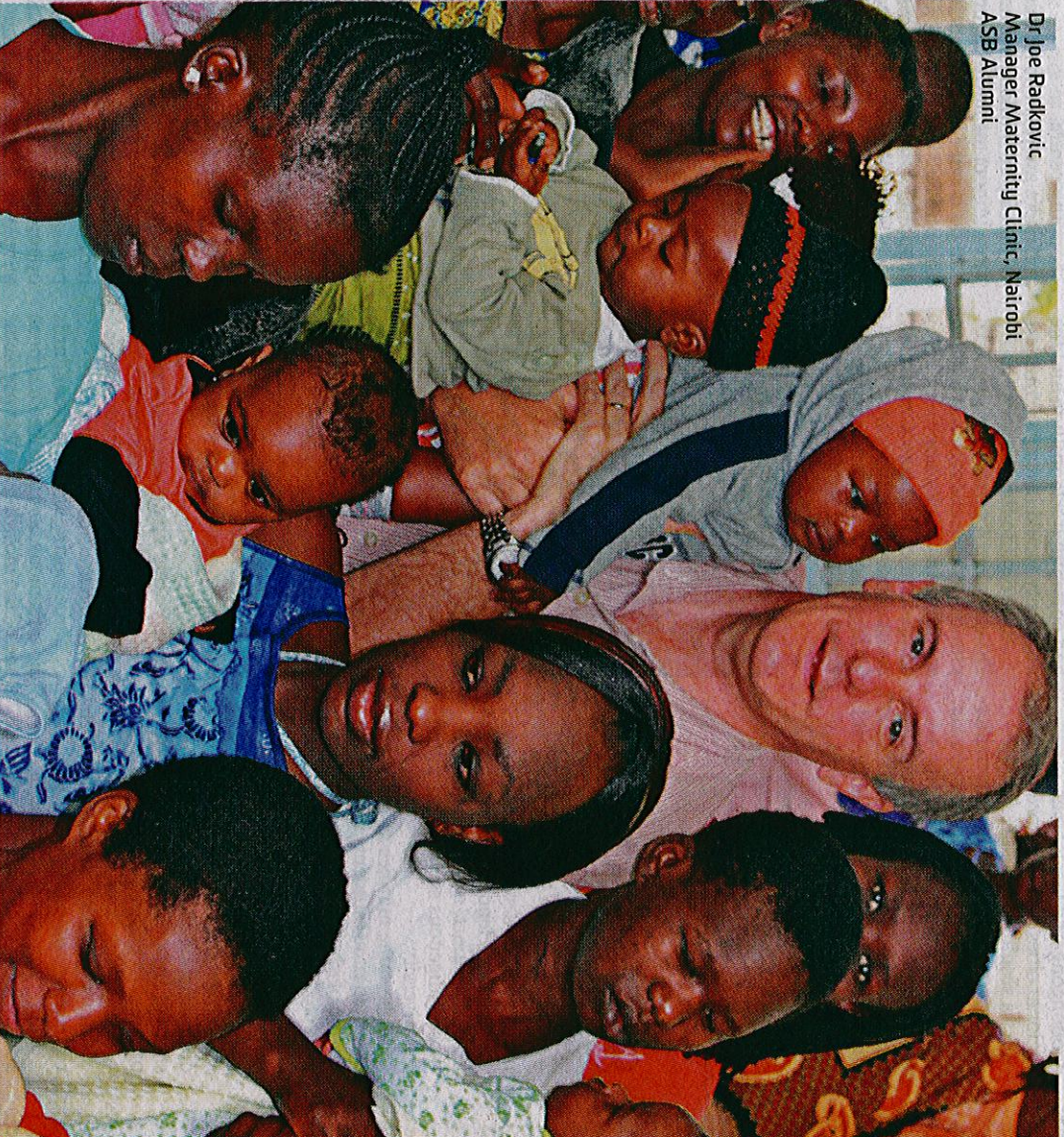
To anyone with an untrained eye visiting the university's Centre for Real-Time Information Networks, this equipment looks like a mishmash of spare parts. But they are laboratory representations of what happens when, for example, a building shakes in an earthquake or force is applied to a structural beam.

All of a sudden and with no one around, a piece of one of the "rigs" will move or a whoosh of air will escape. What this means, says centre director David Lowe, is that somewhere a student has logged in and is carrying out his or her experiments.

"They might be at home, at work, or on a train," he says. "Once they log in, students can reserve time for a future experiment or jump in a queue and wait for the next available machine."

Lowe also sits on the board of the Labshare Institute, a new not-for-profit organisation which encourages universities and schools to share remotely accessible laboratories such as the one at UTS.

In the beginning, UTS wanted to cater for part-time students who had trouble getting to campus at specific times to use laboratories. But it quickly realised there were other benefits, like accessing experiments that would be too dangerous to conduct in person.



Dr Joe Radkovic  
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Establishing and running a medical clinic and maternity hospital in a Nairobi slum requires many skills, especially management.

Dr Joe Radkovic chose the Master of Business & Technology (MBT) at the Australian School of Business for the program's flexibility. Studying with like-minded students online at his own pace

and bringing the learning to his environment allowed him to be a capable manager and teacher to his staff.

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