

# US students pay for downturn

Tuition fees have risen, but public universities still face a shortfall, and students are feeling the squeeze.

The global recession has produced some surprising winners. Take the companies that make 'clickers' — hand-held electronic gadgets that allow students to answer pop quizzes, discussion questions or straw polls during class. As university budgets are squeezed, class sizes are ballooning — and so is the demand for clickers, which help instructors to retain some interactivity in lecture classes of several hundred students. "Big classes are something we benefit from," confirms Kevin Owens, spokesman for Turning Technologies, a clicker maker based in Youngstown, Ohio. Few others can make that claim.

Nearly three-quarters of the United States' 17 million undergraduates attend state-funded universities, according to the Association of Public and Land-grant Universities (APLU) in Washington DC. And those universities are suffering in the recession. When the economic crisis struck in autumn 2008, many state governments rescinded their budgets and made immediate cuts. The 2009 budget cycle brought more pain. A survey of 87 of the APLU's member institutions conducted late last summer found that 85% had had their state funds cut and that 50% had seen a drop in financial resources despite tuition hikes and increasing enrolment.

The result? More than half the universities surveyed admitted that the cuts were affecting their undergraduates' education. Classes are swollen into the hundreds; there are fewer teaching assistants; hands-on laboratory sections and some whole courses have disappeared, programmes and departments have vanished. And it's likely that things will get worse before they get better. Economic recovery has been slow and state tax revenues will necessarily lag behind. Meanwhile, federal stimulus funds approved by Congress in 2009 are set to run out this autumn.

"Most undergraduates will experience larger classes and shorter hours of availability for labs and libraries," says David Shulenburg, vice-president for academic affairs at the APLU. "Some students



Standing room only: university class sizes have exploded as funding has dropped.

simply won't be able to get into courses."

Many of Europe's universities have also seen large budget cuts since the downturn. France and Germany have defied the trend by pumping more money into higher education, but funding has dropped in the Baltic States, the United Kingdom, Italy, Ireland and Romania, according to a report by the European University Association in Brussels.

In the United States, science departments are tending to fare better than their counterparts in other fields, and in the United Kingdom special funds have been designated to boost science, technology, engineering and maths education. And Shulenburg says that at US state universities, science courses are less likely to be cut than low-enrolment humanities courses.

But many science undergraduates are also feeling the squeeze, especially at universities where departmental budgets are declining even as demand for courses increases.

Cathy Koshland, vice-provost for academic planning and facilities at the University of California, Berkeley, says that although money for undergraduate science is tighter than at any time in recent memory, students are crowding into life-science classes. They are lured by an expected boom in health-care employment as

the US population ages and by the growing prominence of biotechnology, bioenergy and biomedicine. "The hot fields at the moment have a strong biological component," says Koshland.

## The domino effect

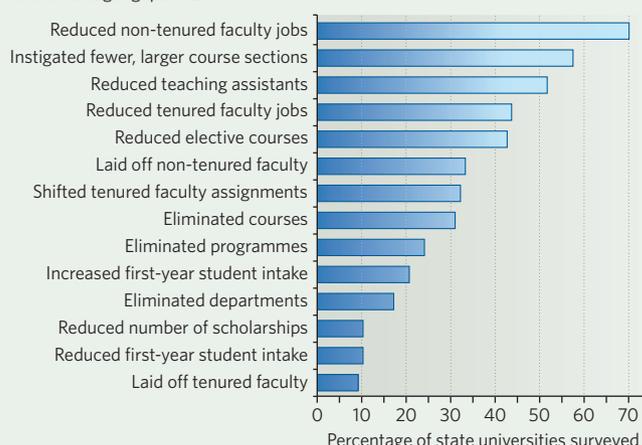
This affects more than just biology departments, she adds. "Students have to have a certain amount of math and chemistry before they take their first biology course," so crowding is increasing in classes for those subjects too. The result is a domino effect that can carry across years of a university programme. To cope with the crowding, departments at Berkeley have reduced the frequency or doubled the size of discussion sections. In some cases, lectures have been decoupled from labs, so that students don't have to take them during the same semester.

Similar stories of shrinking resources and crowded classes are playing out across the country. At the University of Washington in Seattle, introductory biology courses have grown to 700 students and introductory chemistry classes have had half of their lab sessions cancelled. Meanwhile, the College of Southern Nevada in Las Vegas is squeezing extra classes in around the clock — even offering classes at midnight.

Susan Elrod leads Project Kaleidoscope, which is funded, in part, by the National Science Foundation and aims to improve learning environments for undergraduate

## FEELING THE PINCH

Austerity measures implemented by US state universities to close budget gaps in 2009-10.



E. RISBERG/AP PHOTO

SOURCE: APLU

science, technology, maths and engineering. She worries about the effects large classes may have. “Faculty are teaching more students, and that takes away momentum that a department might have gained as far as creating more engaging, interactive courses. It is tempting to just put up the PowerPoint slides and lecture to students, even though we know that this is not very effective.”

The answer, at least until budgets improve, might be clickers, coupled with group work and “good conceptual questions” in classes and tutorials, Elrod says.

Meanwhile, colleges are charging students more for less. Even as class sizes have increased, the Missouri University of Science and Technology in Rolla has raised tuition fees and, as many public universities were doing even before the recession began, looked to private donors to make up for lost state funds. “In the good old days we got about 60% of our operating budget from the state, and now I get about 27%,” says Missouri’s chancellor John Carney. “You can’t have a quality academic programme with smoke and mirrors. You need revenue.”

One bright spot is the University of Michigan at Ann Arbor, which has for years been pursuing a conservative money-management strategy — a response to rocky times in the car industry that forms the state’s economic base. The University of Michigan is set to hire 100 new faculty members by mid-2012. “Michigan has been in a challenging environment for so many years that we have gotten very good at saving money,” says spokeswoman Kelly Cunningham.

But even at Michigan, tuition fees have gone up. In the United States, fees at public universities have been increasing by nearly 5% above inflation every year since 1999, according to the College Board. The average annual tuition fee for an in-state student at a US four-year public university is \$7,020 in the 2009–10 school year, putting pressure on students, parents and college aid programmes. “We’ve seen a dramatic increase in the demand for financial aid and a dramatic increase in the number of students who are eligible for student aid,” says Haley Chitty, spokesman for the National Association of Student Financial Aid Administrators.

The Federal Pell Grant Program promises aid to all who qualify, so federal spending on these grants has “exploded”, according to Chitty. But universities can’t make up holes in their budget just by raising tuition fees and raiding the Pell Grant fund through students. The highest Pell award for 2010–11 is \$5,550. “The Pell grant increase isn’t going to be nearly enough to cover the tuition increase,” says

Chitty. According to Shulenburger, “Students’ dollars are being substituted for state dollars”.

Diane Auer Jones, former assistant secretary for postsecondary education at the Department of Education and current head of the Washington Campus, which provides policy training for business students, thinks budget pain should make smaller state schools rethink their research ambitions (see *Nature* 465, 32–33; 2010). “You look at a state like Maryland where there are these university systems,” she says. “In the old days the flagship and one other were the research universities. All the other campuses in the system were teaching colleges. The problem is that in the past 15 years the non-flagship comprehensive undergrad institutions have all decided that they too need to be research universities.” The result, Auer Jones says, is that administrators have been spending too much on programmes besides undergraduate education. Faculty members are rewarded on

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the basis of their research portfolios, and teaching gets mere lip service.

Auer Jones’s opinions resonate with many in higher education, but, not surprisingly, the institutions contacted by *Nature* all felt that her criticisms were more applicable to other universities. “You would not be able to continue here if you weren’t a good teacher,” says Diane Allen, the provost at Salisbury University, a small Maryland state institution that Auer Jones attended. But, she adds, “all of our faculty are expected to do some kind of scholarly work. They need to stay current in their field.”

### Into the field

John Banks, who teaches environmental science at the University of Washington in Tacoma, says he still sees the value to his students of coming along on his fieldwork trips in Costa Rica and East Africa. They learn things they couldn’t in the classroom, he says. “Everything from linear statistics to negotiating entry to a national park with a ranger with a machine gun at 5 o’clock in the morning.”

Yet although the recession has added stress and cost to the undergraduate education system, most administrators argue that an undergraduate degree remains good value. “I don’t apologize for the tuition we have to charge because when our students graduate they are making 50,000–70,000 [dollars] a year,” says Carney. “It is a tremendous bargain.” Shulenburger agrees. “There’s still no better investment, long run, than getting that degree,” he says.

All those in agreement, press your clickers now. ■

Emma Marris