



Einstein, Stephen Hawking and Alexander Ross starred in Rosalie Primary School's physics play. The real Alexander Ross is watching over them from his portrait.

Deep physics can be child's play

Star physicists from Euclid to Einstein, Alexander Ross to Stephen Hawking, made an appearance at the School of Physics recently – presented by year six students from Rosalie Primary School.

The 11- and 12-year-olds performed a play, *Free Float*, which reinforced the ideas of time and space that they had been learning about from Winthrop Professor David Blair, over the preceding six weeks.

The play, hugely enjoyed by Physics staff and other guests, was the culmination of a pilot study by the Science Education Enrichment (SEE) Project, an ARC-funded project that is exploring and measuring the effectiveness of science education enrichment programs, in partnership with the Gravity Discovery Centre and the Graham (Polly) Farmer Foundation.

Professor Blair believes that science education is caught in a time warp.

"It has its origins in the ancient Greek mathematician Euclid, whose writings became the most influential book in the history of science," he said. "It has been in print for more than 2,000 years and was a basic school text for Galileo, Newton, Einstein and for most people of my generation.

"Newtonian physics is founded on Euclidean geometry but Einstein's theory of gravity suggests that Euclid's geometry was fundamentally flawed. Space is not flat as Euclid assumed and his geometry is simply wrong. Today's physicists and astronomers deal with curved space every day – even our GPS navigators must allow for the warped spacetime around the Earth.

"The general belief is that Einstein's physics is too difficult to teach in school. Most people who go on to be teachers maintain the Newtonian mindset – and so we remain in a Euclidean time warp."

So Professor Blair (who has a son, Julian, in the Rosalie class) and his SEE partners, Winthrop Professor Grady Venville and

Associate Professor Nancy Longnecker, set out to discover whether primary school students could come to grips with modern physics, unlike many of their parents, whose eyes tend to glaze over when such concepts are mentioned.

"I asked them if they thought they were too young to understand this stuff and they said no," Professor Blair said.

Professor Venville said the students easily grasped some of the ideas. "They learnt to think about spacetime, they learnt to appreciate that falling from a tower and floating in a space station are really the same thing," she said. "The astonishing thing was that the students were not very surprised."

Free Float covered the history of notions of gravity from Euclid to Newton to Einstein. More recent physicists included Professor Alexander Ross, who founded UWA's School of Physics and who led the historic Wallal Downs expedition in 1922 that confirmed the curvature of space around the Sun. The children asked and answered questions about space, time and gravity, with humour and even a short rap performance by Einstein.

Professor Venville will be studying a written assessment completed by all the children, which should show the extent of their understanding of the concepts. She and her colleagues observed some of the classes at the school and Professor Venville will also be interviewing some of the students.

"I can't speak highly enough of David," she said. "He worked closely with the children, using lots of analogies to which they related. He is a fabulous interpreter of science."

Professor Blair is renowned among his colleagues for having the last word. "You don't have to think about Darwinian evolution when you go to the doctor. And an architect doesn't need to worry about curved space when he designs a building. Yet the reality is important," he said.

"We owe it to our children to teach our best understanding of reality instead of a 300-year-old approximation."