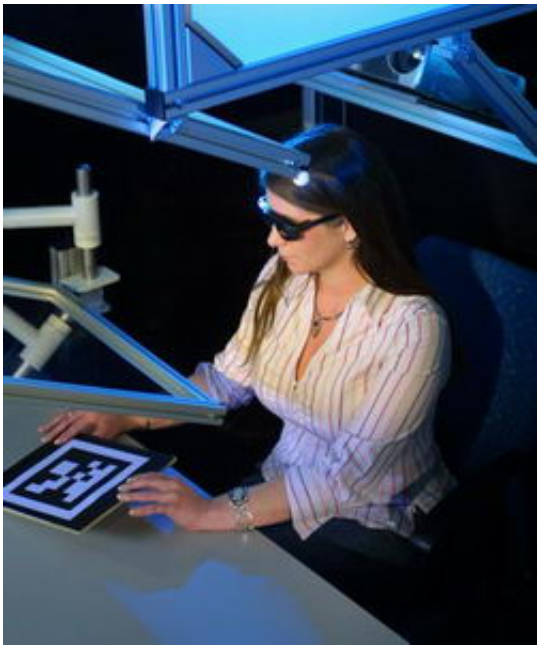
Learning in the spinning room

February 1 2007



The modern spinning room combines the real world with virtual 3-D objects – enabling students to learn in a vivid and playful way. © Fraunhofer IAIS

Learning from books can be a dry and boring experience for school students. The spinning room, in contrast, is highly entertaining: it combines the real world with virtual 3-D objects and explains science to school students in a vivid and playful way.

Students can watch with their own eyes as fats and proteins, represented by virtual objects, pass through the mouth, slip down the esophagus and are digested in the stomach. Instead of poring over books, they can

observe the digestion process in the virtual world.

This is made possible by a futuristic learning laboratory that has been developed by researchers at the Fraunhofer Institute for Intelligent Analysis and Information Systems IAIS in collaboration with their partners in the European ARiSE project. In fact they borrowed their concept from the old rural spinning room. In the modern version, school students can develop something new from raw materials – and spin ideas.

"The student sits in front of a semitransparent mirror which is positioned at an angle," says ARiSE project manager Jürgen Wind. "Beneath the mirror lies a plastic model of the digestive tract – from the mouth to the stomach and from there to the intestines. When students look through the mirror, they not only see the real model below it, but also virtual information." This information is projected onto the mirror from above, along with images showing processes such as the decomposition of various nutrients in the stomach. To look more closely at a particular section of the digestion process, the student points a marker at the appropriate place on the model.

But how is the virtual image made to appear in 3-D? "The computer alternately creates an image for the right eye and an image for the left eye, at a rate of 120 frames per second,« Wind explains. "In addition, the user wears a pair of goggles which alternately darkens each lens at the same rate." The eyes and the brain are unable to resolve such a fast sequence of images; instead, the images that actually follow one another in quick succession overlap in the observer's brain to form an apparently three-dimensional object, in a similar way to stereoscopes or 3-D cinemas. The big advantage of this projection method is that the necessary hardware is located behind the student, leaving the surface in front of the viewer free for the real models – such as the plastic model of the digestive tract in our example.

"The spinning room is not only suitable for use in schools but also in any industrial environment where products are developed and designed," remarks Wind. He and his colleagues will be presenting their invention to a wider audience for the first time at the LearnTec trade fair in Karlsruhe from February 13 to 15.

Source: Fraunhofer-Gesellschaft