Stars of the screen

NEC is trialling a revolutionary 3D projector system for university lecture theatres

NEC Display Solutions is continuing to drive the adoption of 3D technology by the digital classrooms of Europe's colleges, launching pilot projects in Finland and the Netherlands in co-operation with its partner, Texas Instruments. Participating establishments will be equipped with complete 3D projector systems for a period of six weeks. This will allow pupils to get to know new forms of teaching that could in future support learning processes and promote innovative teaching concepts.

University lecturers are faced with the challenge of communicating course content to pupils and students as effectively as possible so as to support them in their learning process. An important factor here is being able to gain and keep the attention of the class by making the subject exciting and presenting it in a captivating way. Even more demanding teaching content from, say, geometry and physics, can be easily conveyed if presented in the right form and can increase the pupils' and students' comprehension and learning effectiveness. So much for the theory. But how can this be achieved in practice using modern technical aids? While the odd film has often been shown in biology lessons, or the insides of frogs and fish have been presented on the desk, the picture is a lot more difficult for complex subject material from geometry, astronomy or physics. So it is not surprising that these disciplines are rarely found among the top three most popular subjects as regularly documented by the findings of surveys and studies.

The third dimension

In future, 3D projection technology will make a big difference in this field. The frogs mentioned above will be viewed digitally without students themselves having to touch them. Other examples include wandering around historic buildings to explore their architecture or taking a trip through the universe in order to gain a better understanding of astronomy. By making part of the content real and tangible in 3D and giving pupils and students the chance to interact, lessons will become varied and will enjoy heightened interest on the part of the class. The efficiency of knowledge transfer can also increase. Initial findings from tests already carried out with American school classes that were published in various user reports earlier this year by Texas Instruments, NEC's solutions partner, at least seem to suggest this. Test subjects generally performed better with 3D tuition compared to the results of control classes who were presented with the same material in 2D. Pupils as well as teachers also rated the lessons themselves more positively. The spatial representation of course material and the possibility to interact resulted in higher attention levels and greater participation in lessons among pupils. Empirical results are not yet available due to the very early phase of the test, but there is a clear tendency in a positive direction.

The incorporation of 3D presentations into lessons in Europe is still in its infancy. According to current forecasts, this technology has not yet established itself on the general market and, what is more, economic factors in particular play a decisive role for investment in education. Over the last few months, NEC Display Solutions has created the technological basis for 3D projection in the education and corporate fields with a range of powerful projectors. The manufacturer is now focusing on implementing and optimising the solutions in practice.

Which technology?

3D projection is possible with both DLP and LCD projectors. The first method is based on DLP Link technology, which was developed by Texas Instruments and which provides a refresh rate of 120 Hz. The technique allows 3D images to be projected with the aid of a single projector and active LCD shutter glasses. The projector generates consecutive alternating images for the left and the right eye at a rate of 60 frames per second. The liquid crystal in the shutter glasses are synchronised with the projector and are switched between transparent and dark to match the projector. The difference in perspective that results from this creates the 3D effect. The technology can be deployed quickly and easily. Furthermore, it is affordable since it does not require special screens or filters for rendition or an emitter for synchronisation. This is what makes it particularly interesting for the classroom of the future and therewith the best choice for 3D pilot projects in the education sector.

The second possibility is suitable especially for large rooms such as assembly halls, auditoria or conference halls since brightness is the deciding factor here. Two LCD projectors whose images are exactly superimposed are required in order to use 3D. NEC Display Solutions offers special installation projectors that are equipped with a unique stacking setup. The units project light polarised for the left and right perspectives onto a central screen with two polarising filters in front of the lenses only allowing rays of light to pass at the relevant oscillation level. Polarised filter glasses take care of the rest. Thanks to two polarisation filters that only allow the appropriately polarised light to pass, each eye only receives the image it is supposed to.

However, some questions remain open. It is still unclear, for example, how easy it will be to integrate the technique into different teaching subjects, what the best support will be for the participating educational institutions and teachers, and how much more effective lesson content imparted through 3D projection actually is. Practice will provide the answers to these questions.

Initial conclusions

With pilot installations in the Netherlands and Finland, NEC Display Solutions intends to investigate for the first time the practicability and effects of 3D teaching in real-life situations. The first phase of the global project began in July 2010. The parties involved reached agreement after brief and successful talks on the necessary basic conditions for the pilot installations such as eligible schools, the time frame and the form of assessment. Each of the countries taking part has been equipped with a total of three 3D systems, the core of which is a TCO-certified, 3D-ready NEC NP216 DLP projector. This model provides XGA resolution and, with an integrated RJ45 interface, has a fast and simple LAN connection.

Further components of the 3D package include a notebook with a graphics card supporting 3D, 30 pairs of LCD shutter glasses and a comprehensive

software package from the 3D content provider Amazing Interactives. This contains, among other things, the interactive 3D applications 'Discover The Senses' to investigate human senses and 'Maths Tutor', a collection of learning elements for visualising geometry lessons. The package is easy to use for the participating teachers, requires no major technical knowledge and can of course be used for 2D projection.

Five primary schools from the Laurentius Stichting (non-profit foundation) are taking part in the project in the Netherlands. The foundation runs a total of 24 schools with 750 teachers and up to 7,500 primary school students and supports them in trying to keep up with the ICT-innovations of every day. When Deborah van der Kuil-Jansen, Staff Member of ICT division at Laurentius Stichting, heard about the possibility of participating in the project, she was highly enthusiastic. "We are constantly looking for opportunities to improve our education so that our students are and stay motivated to learn. For example, for some children the abstract part of the curriculum is difficult and gives them problems. We think that showing 3D content helps

teaching and learning. The use of 3D learning materials needs to enhance student engagement and motivation but this is only the start as we want to proceed into allowing students and teachers to manipulate and create their own 3D learning materials, for example."

The launch is scheduled for November in the Netherlands and for December in Finland. The teachers involved from the target disciplines of mathematics and science have been asked to augment their lessons with appropriate 3D content. For example, a biology teacher can add a matching interactive 3D presentation to a lesson on hearing in humans. On the other hand, a maths teacher can supplement his/her remarks on geometric shapes with a 3D presentation of the rectangle, circle or trapezium. At the end of the agreed six-week test period it is planned to conduct a survey among the relevant teachers and pupils where they can describe their impressions of this new form of teaching and make suggestions for improvement. Additional tests on the subject content taught will be conducted in order to provide further qualitative assessment. The results will be compared against those for a control class who

"Showing 3D content helps students to understand the curriculum better and makes it easier for them to stay focused"

them to understand the curriculum better and makes it easier for them to stay focused. Furthermore, the technology enables us to address multiple intelligences and gives us the possibility to have better results with more students because of it."

The project partner in Finland is the City of Helsinki Education Department, which is responsible for almost 200 primary and secondary schools and thus for about 50,000 pupils. Especially the Media Centre has to ensure that all technical equipment, programs and tools provided by the IT Department are pedagogically relevant and suitable. To this end they conducted a set of pedagogical pilots in selected schools and user groups, which are used to collect data and thereupon to make conclusions which, for example, can provide the basis for developing and organizing the technological support systems (IT Department) and in-service training (Media Centre) needs for staff and teachers involved. Jukka Orava, ICT specialist at the Media Centre, was highly delighted about NEC's request. "3D technology is reality today and we need to find the best solutions in this technology and its suitability for school use. We also want to incorporate 3D's possibilities to support collaborative inquiry based

will receive the same content presented in 2D.

"The insights gained from the two pilot projects will point us in the right direction towards a European 3D network in the field of education. They will also help to continue to improve collaboration between all hardware, software and content manufacturers involved," says Ulf Greiner, Product Manager Business Projectors at NEC Display Solutions Europe. According to NEC, the shared goal is to implement 3D technology and extend the digital classroom to the educational institutions of Europe and thereby to improve teaching and learning efficiency for the vocational requirements of tomorrow. *CEM*