

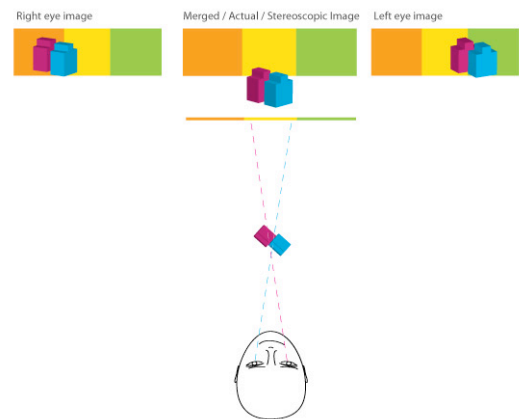
## XPAND 3D Education White Paper

Nothing captures the attention of students like 3D!!! As we all have seen over the past couple of years, 3D technology is becoming a bigger part of the entertainment experience, whether it's at the movie theater, in the home, or in gaming environments. However, the benefits of 3D extend much further than providing entertainment value. When considering the impact of 3D technology on education, it's no surprise that more and more schools and universities are beginning to incorporate 3D into their classrooms. With a 3D curriculum, teachers can create a completely immersive environment in which students can learn more complex concepts, increase their test scores & retain information for much longer periods.

### Section A – 3D Technology

3D (or stereoscopic) viewing works by presenting two different images to the left and right eye, simulating what our eyes see in real life. The brain combines the two images to create the perception of 3D depth.

Active 3D systems work by alternately displaying the images for the left and right eye in rapid succession – too quickly to see the images separately. To separate the images, active shutter glasses are worn, which block the right eye at the moment the left image is shown and vice versa. The glasses are synchronized with the projector or TV screen that sends signals to the glasses controlling when each lens opens and closes. Active 3D systems offer brighter, clearer images with the widest viewing angle, even with large screens.



### Section B – Benefits of 3D in Education

#### Test Results

According to studies conducted by Texas Instruments, which provides the DLP<sup>®</sup> (Digital Light Processing) chips used in a number of 3D and standard (2D) projectors, using 3D as a classroom learning tool results in higher average test scores compared to presenting the material via 2D projection or from books.



The Rock-Island-Milan School District of Rock Island, IL conducted a study in which two groups of sixth-grade students received a ninth-grade-level earth science lesson, one with 2D and the other using 3D projection. The students were tested before and after the lesson. The 2D control group test scores increased 9.7 percent, while the scores of the students who saw the lesson in 3D increased 35 percent.

In a study conducted at The Abbey School in Reading, UK, four classes were given a lesson in the structure of the human eye using 2D illustrations and via a 3D projector. In multiple-choice tests given after the lessons, the mean score for the 3D-taught students was 8.33 out of a possible 10, while the traditionally taught children had a mean score of 7.00.

## Higher Retention Rate

Students who receive 3D learning remember more of what they were taught. A student at the Emmbrook School in the UK said, “I was taught the anatomy of the human eye using the 3D projection models, and I feel I remember more now – six months later – than if I had been taught using a textbook.” Lauren Sanders, a math teacher at Shelton School, the largest school in the U.S. for learning-different students, “Our school has many students with ADHD, but I found that my class was much more focused when we introduced the 3D lessons. Usually, I get lots of questions through which they confirm their understanding of the material...but this time, I received far fewer questions...they were more patient and eager to explore the content.”

## Enhanced Learning Experience and Excitement

Students who participated in 3D learning were more engaged with the material, and more excited about the experience. In a 3D lesson about the anatomy of the human ear given at Rock Island, IL, students reached out into the air to try to touch the parts of the ear as they seemingly floated in front of them. Kathryn Macaulay, Deputy Headmistress at The Abbey School in the UK noted, “The way...3D projectors help every child engage in their subject is invaluable. It literally gets them off their seats and grabs their attention.” A student added, “3D will always be exciting. It’s different to a textbook because it adds so many layers and brings so much depth to what we are learning.”



Principal Megan Timme of Hamilton Park Pacesetter Magnet of Dallas pointed out, “I believe the kids are more engaged because they are able to take abstract concepts and make them more concrete in their minds. An engaged child is a successful child.”

## AOA

After an extensive report produced by vision researchers and specialists advisors from across the 3D industry, the American Optometric Association (AOA) has explained how the 3D approach to learning serves as a fulcrum for enhanced teaching and improved assurance of school readiness.

The ability to perceive 3D and learn in 3D requires precise elements of “vision fitness.” This deals with eye alignment, and eye tracking. The recent emergence of innovative 3D presentation technologies and 3D content in movie theaters, in the home, in video games and now in classrooms, all help to increase the “fitness” of the human eye. The ability of the eye to respond to this technology increases the health of the eye.

When an individual experiences any of the 3 ‘D’s’ of 3D – discomfort, dizziness, and lack of depth perception – these signals can serve as an early indicator of some measure of vision impairment. Once identified, treatment can help cure these impairments, increasing the vision fitness of the child during important developmental stages. With the new use of active 3D systems, it eliminates the stress caused on the eye and brain and is, therefore, safer and easier to use for all individuals.

## Section C – Solution – XPAND 3D Education Network (an Ecosystem with the expertise)

The XPAND 3D Education Network solution provides everything needed to make implementing 3D in the classroom a breeze, including: Computer, 3D Ready Projector, 30 XPAND 3D glasses, a carrying case, and access to XPAND 3D's Educational Content Library, a one-stop-shop for all your 3D content needs.



### XPAND 3D Glasses

XPAND's X102 DLP Link Active Shutter 3D glasses are specifically designed to work with 3D-ready DLP projectors and provide the brightest images available with no flicker or viewing artifacts.

No installation is required – they turn on with a simply touch to the right temple where the surface is a touch sensor and they turn off automatically when not in use. XPAND 3D X102 DLP glasses are known as the most rugged, durable and washable glasses engineered to withstand repeated use.



XPAND 3D also offers a variety of glasses that communicate across multiple platforms; such as, Infrared (IR) and Radio Frequency (RF) technology. This allows schools to choose XPAND 3D glasses that work with LCD projectors, plasma and LCD televisions, etc. depending on the school's preferred medium of viewing 3D.

### 3D Educational Content

Educational Institutions are continuing to adopt 3D technology into their classrooms daily as 3D learning can have a profound impact on knowledge retention among students.

XPAND 3D has teamed with industry leaders to supply their network members with high-quality educational 3D content. Once a school joins the XPAND 3D Education Network, it is given access to XPAND's 3D Educational Content Library, which includes contributions from educators around the world. It will become an online database shared by many educators, making the sharing and learning environment far more entertaining. XPAND is a one-stop-shop to make 3D content easy to obtain.

