Augmented Reality in Modern Education

By Scott Jochim

Technology, in its noblest form, is used by individuals who want to empower themselves to be on the forefront of education, development, and progression.

The difference between novelty and standardization at the core learning level is more than just regurgitation, it is the ability to excite and deliver increased test results and awareness for the information. The additional caveat of technology must have a sense of applicability to the current generation that is being taught. Today, technology should be able to deliver both of these things, or we will continue to fall behind in teaching our future generations.
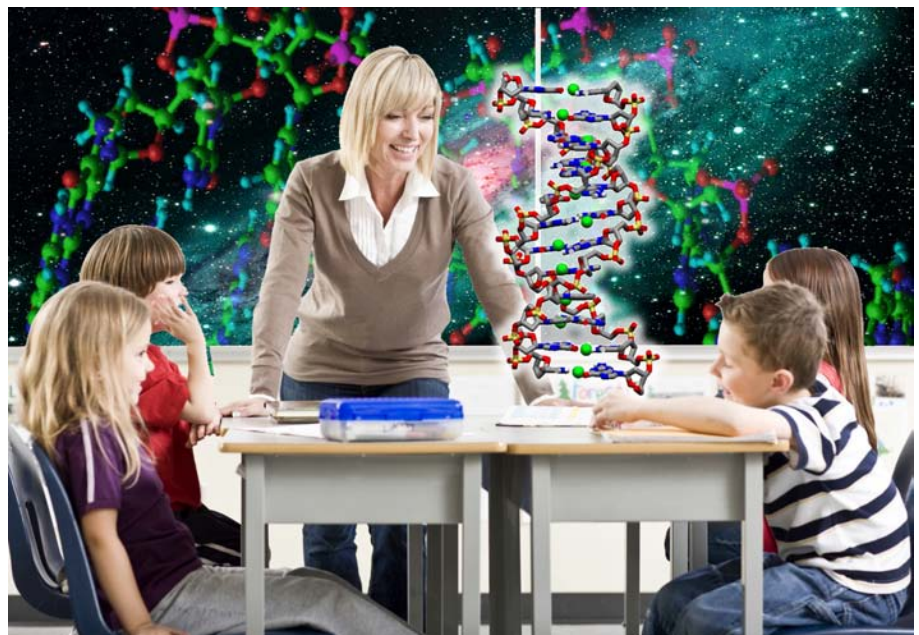
> "The 3D lessons bring an excitement to the classroom that is palpable."

Tracey Masamoto
Director for JTM Concepts.

We rely on standardized testing to level the playing field. Isn't it about time to have a set of tools that creates a platform for educational success and achievement? Welcome to the new age of Augmented Reality classrooms where students can see and interact with virtual objects like planets, volcanoes, the human heart or dinosaurs that appear right before their very eyes…this is the future of education.

With Augmented Reality, lessons come to life in a whole new way. Literally add a whole new dimension of excitement and accessibility to subjects like geography, math, science and history by allowing students to feel like they are there. It's an unprecedented educational opportunity. In the immersive teaching environment provided by the Augmented Reality Development Lab (ARDL) designed by educational software innovator Digital Tech Frontier, LLC., students experience clear and complete visualization of difficult concepts and subject matter all while remaining intriguing and exciting! Augmented Reality (AR) is a revolutionary concept that makes virtual, 3D objects appear in the real world, while attached to real objects. Users simply need a web camera that is focused on a scene that contains a "Magic Markar"™ (essentially black and white squares that the software can recognize). The user then looks through a Virtual Reality Viewing Device or at a computer monitor, projector screen or interactive whiteboard to see virtual objects like the human skeletal system, a moon eclipse, or various members of the animal kingdom. These Markars can be attached to cards, the pages of a book, interactive white board or even on the floor or wall to provide a 3D animated replica that fills the room.

With AR, the user feels like they are working with real world, everyday objects. Even better, AR enhances the ability to collaborate, as users can see both virtual objects and their colleagues at the same time, which aids in visual communications. Virtual objects excel at conveying spatial, temporal and contextual concepts, especially when the real objects are too expensive, dangerous, or fragile.

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Magic Markar™

AR is highly interactive, allowing users to erupt a volcano, build a human heart, or pull planets out of the solar system for closer inspection. The future of education is now in the hands of the students… virtually. The Augmented Reality Development Lab (ARDL) is the fusion of cutting-edge virtual 3D technology with the commitment to exceptional and thought-provoking education. Learning becomes natural and retention sky-rockets when a student can experience their course content by interaction.

> "The ARDL allows my visual learners and opportunity to really grasp the material."
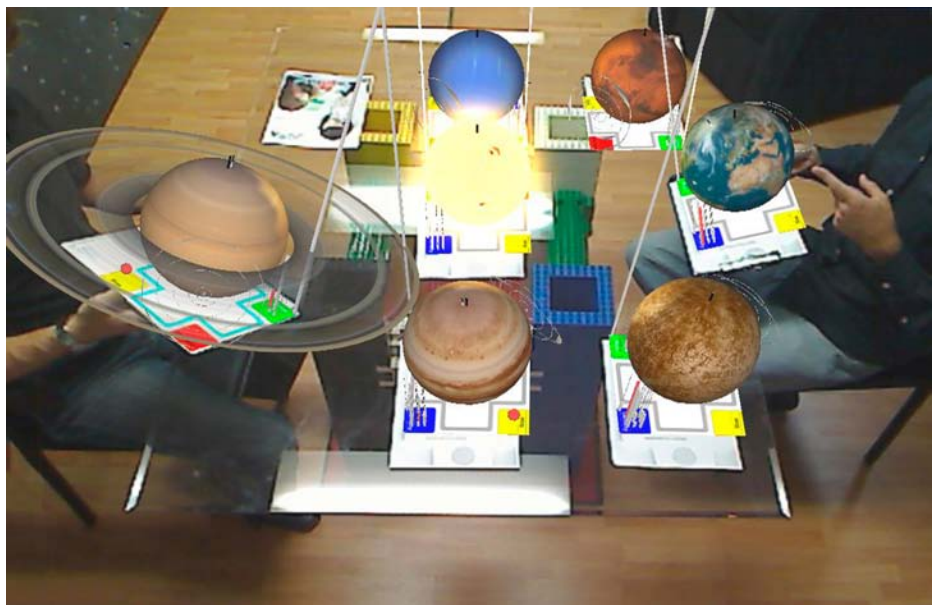>
> Debra Sloan, Educator
> Forest Heights Middle School Arkansas

For example, a student that can interact with the molecules of a substance is much more likely to learn and remember how that molecule works along with its structure and make-up. Augmented Reality allows students to have a more in depth and hands on approach to learning and understanding. Many instructors today lack access to the proper tools they need to build truly effective educational curriculums. The ARDL is a solution that helps empower the driving force in education so that instructors can tailor or customize their curriculums to any grade level.

Then and now

From the earliest days of the classroom, teachers have always struggled to keep the full attention of their students during a lesson.

In a Rock Island, Ill., science classroom, there was a study done to determine how students test scores and their learning capabilities are affected with the introduction of 3D virtual objects to help them better understand the curriculum. Using a sophisticated visual simulation specially developed as part of the Classroom3® Initiative, a partnership with JTM Concepts and the Rock Island-Milan School District, the teacher can "disassemble" the components of the human ear within the 3D realm. In this enhanced learning environment, students pay rapt attention and cover more material in less time than ever before. Students with learning and attention challenges fully absorb the material, and all students show significant increases in their test scores. The first comment from teachers who used the ARDL was that there were no discipline issues with their students which amazed them. Secondly, they noted that every student passed the exam, which was unprecedented. (Rock Island-Milan School District "Improve test scores with 3D study") [5]

Visualizing the Solar System with the ARDL [1]

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As 3D technology evolves from an intriguing novelty to a mass-market phenomenon, educators are rightly looking for two keys: which curriculums can be designed to take advantage of this technology, and does 3D learning have a measurable and meaningful impact on education outcomes? In Illinois, thanks to grant funding and successful pilot programs, tens of thousands of students are on track to learn from dozens of 3D simulations.

Effective and Fun

The study showed that students pre-test vs. post-test scores improved up to 35% after seeing a lesson in 3D compared to the mere 9.7% increase experienced by the control group who did not view the 3D lesson. Furthermore, when the data was broken down by subgroups including socioeconomic status, ethnicity, male/female and math ISAT scores, all groups showed gains from 29% to 35%. And 3D presentations of math concepts increased scores for females slightly more than males – helping to close the traditional gender gap in math. As one student in the study remarked, "If I could learn everything this way, my grades would go from Fs to A+s." The improvements were significant and frankly, amazing, compared to traditional textbook methods…and as our teachers saw greater simplicity and more lessons and excellent outcomes, they have become even more enthusiastic about using 3D in their classrooms."[5]

Learning Math with the ARDL [1]

A New and Better Way

As we continue to evolve and improve teaching, I think it becomes apparent that we can really improve the effectiveness of education and respond to a wider variety of students. Debra Sloan, an educator with Forest Heights Middle School's Eagle Environmental and Spatial Technology (EAST) program in Little Rock, Ark., uses the ARDL in the schools project based service learning class. The ARDL interface has prebuilt education modules for science, math, art, and social studies, as well as a module builder for building new software. The system lets students and teachers build programs, modules, examples, and curriculum using Augmented Reality. Students and teachers also can network and share the modules they've created with other students and schools. "The ARDL is such a nice direction to go…in incorporating technology in the classroom," Sloan said, adding that students "love more than just sitting and watching things happen."[3]

Key Benefits of Augmented Reality (AR)

- ◉ Excels at conveying spatial and temporal concepts
- ◉ Multiple objects can be placed in relative context to one another or relative to objects in the real world
- ◉ Maximizes impact, creates contextual awareness, enhances engagement, and facilitates interaction
- ◉ Heightens understanding with kinesthetic learners
- ◉ Provides a high degree of engaging, self-paced interaction, and maintains interest
- ◉ Improves communication, learning retention, and interaction with others
- ◉ Includes both professionally built content and an AR content building tool suite.

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In April, Qualcomm's Wireless Reach Initiative, together with San Diego's School in the Park program and the San Diego Museum of Art, launched a project that gives San Diego elementary school students the opportunity to learn about art with AR.[4] "In its simplest form, Augmented Reality is an effort to merge physical and virtual worlds," said Patrick O'Shea, director of the Handheld Augmented Reality Project (HARP) at Harvard University. O'Shea collaborated on the School in the Park program with San Diego officials.[2]

> "Allowing students to have the power to interact with the curriculum will change the face of the typical classroom utilizing a hands on, engaging technology infused learning experience."
>
> Robert Siddell,
> V.P of Operations-Digital Tech Frontier, LLC.

The program allows students to explore Asian art and folktales using AR experiences to enhance learning. "Of course, there's a learning curve that goes along with any new technology, but the thing that's really promising about this type of experience is how engaging it is for students," O'Shea said. "Anything that engages students is a net benefit in the long run."[2]

Visualizing the Heart with the ARDL[1]

Tomorrow's Tools Today

It is essential to the overall effectiveness of a school to always be adopting new technologies that support a track record of academic excellence, provide outstanding classroom facilities, develop programs that support student achievement and gather a motivated and engaged faculty. We firmly believe that the ARDL will open up a world of new, enhanced learning by making visualization a core support for the curriculum.

One of the most important initiatives is identifying the advantages of using visualization as an essential technique in the classroom, which has a greater impact on students than straightforward lessons. AR technology lends itself to these and numerous other styles of learning. Through the use of AR technology, an empty space is turned into a very rich educational interactive environment that will prepare your students for the marketplace of the future.

For more information on these technologies and referenced articles:

Digital Tech Frontier, LLC. - www.ARDevelopmentLab.com 888-587-7529 [1]

Patrick O'Shea, Director of the Handheld Augmented Reality Project (HARP) at Harvard University [2]

Debra Sloan, Educator with Forest Heights Middle School's (EAST) program in Little Rock, Ark. www.eastproject.org [3]

Qualcomm's Wireless Reach Initiative [4]

DLP Case Evaluation-Classroom³ 3D Case Study – www.DLP.com [5]