

Augmented Reality Development Lab

Another Educational Innovation by

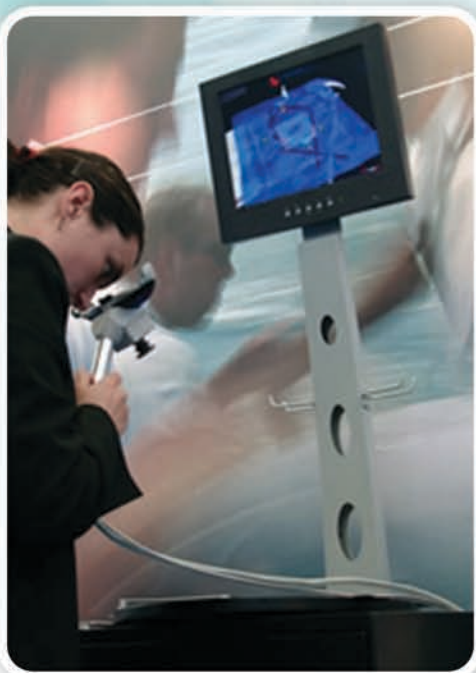
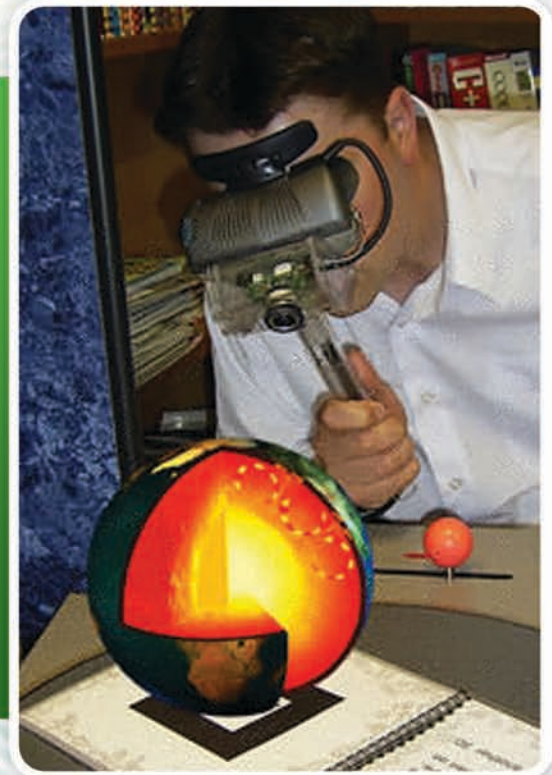
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Bring Virtual Reality to Your Classroom Today!

What Is It?

The ARDL is a revolutionary concept that makes virtual, 3D objects appear in the real world, attached to real objects. Users look through a Virtual Reality POV Viewing Device or at a monitor to see virtual objects like planets, volcanoes, the human heart or dinosaurs. These can be attached to cards, the pages of a book, the chest of their friend or even on the floor or wall to provide a 3D animated replica that fills the room. Virtual objects excel at conveying spatial, temporal and contextual concepts - especially where the real objects (or real replicas) are too expensive, dangerous or fragile. They can also be highly interactive, letting users erupt a volcano, build a human heart or pull planets out of the solar system for closer inspection.



How Is It Applied?

The ARDL rolls this into an affordable package that can be purchased by the public and used at home or in schools on any computer. Both require an initial outlay for equipment and optional additions of new content. Both new content created by Digital Tech Frontier and by students will be released on a regular basis. Currently, content can be used and created with Sketch Up and Microsoft.net software.

How Does It Work?

A web camera is focused on a scene that contains camera tracking markers (essentially black and white squares that the software can recognize). Each person then looks through a handheld display system called a Virtual Reality POV or at a monitor. What the person sees is exactly what camera sees, except that the software replaces or enhances the camera tracking markers with virtual, 3D images. The person can then interact with those 3D images by manipulating the markers. The person's interaction and manipulation of the markers can also trigger narration and sound effects. Markers can be a variety of sizes and attached to almost any flat surface, which means they can be used in many interesting and effective ways.

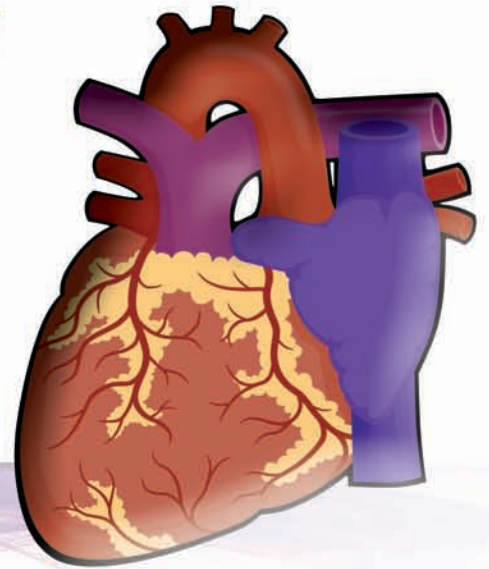
This technique is called Augmented Reality (AR) because a view of the real world is being augmented with virtual, 3D objects.

Virtual Reality is a similar concept, but differs in that it places the user in a completely virtual world with no indication of reality. With AR, the user feels like they are working with real, everyday objects. AR also enhances the ability to collaborate, as users can see both virtual objects and their colleagues at the same time, which aids in visual communication. In addition, placing a virtual object in the context of the real world can make it more meaningful and increase the educational benefit of the experience.



Now your students can:

- *interact with a live volcano*
- *assemble virtual molecules*
- *examine a beating heart*



Why Use the ARDL, and what are the Educational Benefits?

AR excels at **conveying spatial and temporal concepts** - especially when it comes to virtual objects that represent objects that are too expensive, dangerous or fragile to be used in reality. Multiple virtual objects can be placed in relative context to one another or relative to objects in the real world in order to maximize impact, create contextual awareness, enhance engagement and facilitate interaction.

AR is an intuitive interface, as all of us are very familiar with rearranging objects in our everyday life. This also means that AR can be very appealing to **kinesthetic learners** and can provide a high degree of engaging, self-paced interaction. In addition, it can simultaneously present information as text, still images, video, 3D animations, narration and through sound effects and music, which maximizes impact and maintains interest.

Educational Benefits of Using AR

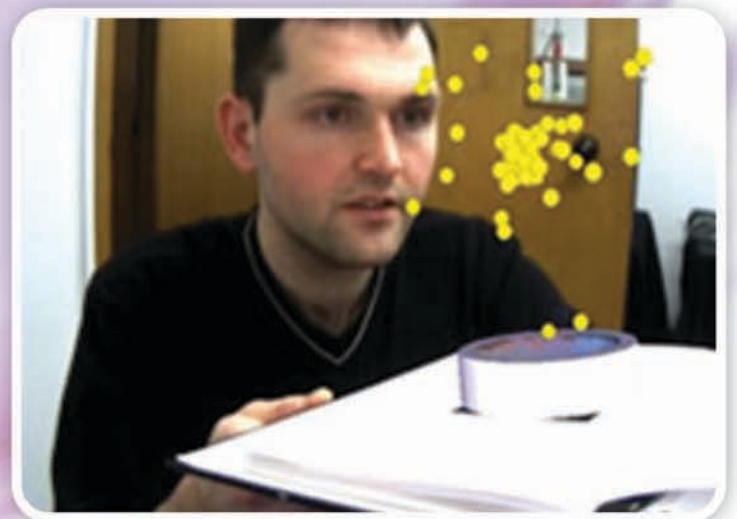
The ARDL has a wide variety of uses, as it can clearly demonstrate spatial concepts, temporal concepts, and contextual relationships between both real and virtual objects. The main advantage of using virtual objects is that they can be animated, respond to the users actions and are not constrained by the costs and practical or physical limitations of real objects. These factors make AR a powerful educational tool.

Clearly demonstrate spatial concepts, temporal concepts, and contextual relationships between both real and virtual objects.

The temporal concepts of volcano formation and eruption for example are much harder to convey in other mediums, such as a book. The spatial concepts of planetary orbits are difficult to convey in both books and videos. Illustrating contextual relationships is possibly the strongest benefit of AR. Being able to hold virtual planets beside each other to compare them, and being able to see the earth with the locations of its volcanoes in context and then in context to the locations of the earth's tectonic plates is very beneficial for enabling exploration and developing critical analysis.

AR can also appeal to students who learn best through kinesthetic means. Not only can they manipulate tangible markers, they can also create their own scenes.

Constructivism as an educational theory states that students should contrast their own knowledge framework on the foundation of their existing knowledge, and then challenge this framework to ensure it is valid (Oliver 2000, Willis 2000) Augmented Reality can assist in letting students explore the information at their own pace (helping construct a knowledge framework) and can also enable critical analysis to assist in challenging this framework, which indicates that AR has considerable educational potential and benefits.



What does the ARDL Learning Module and Hardware Kit come with?

- A set of 7 AR foam marker paddles
- Template for unlimited additional AR foam marker paddles
- 5 Wide angle USB 2.0 video cameras
- 5 Seat license for the ARDL Software Suite

The ARDL Software Suite 2010-2011

- *Beta 1.0: Augmented Reality Module Builder (requires Microsoft.net knowledge but full video tutorials are available), Sketch Up Exporter and Viewer.*
- **Full Modules:**
 - Space Module
 - Virtual Creature Mirror
- **Introductions:**
 - Earth
 - Human Body-Heart
 - Math

Coming Soon: 2010

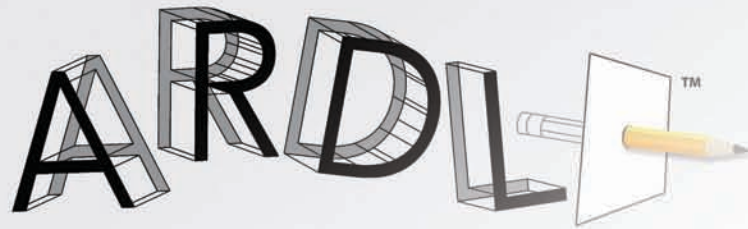
- *Math: 3D Multiplication, Geometry*
- *Human Body: Skeleton, Eye System, Ear System*
- *Chemical Molecules: water, ice, carbon Bucky balls, caffeine, THC, complex lipid*
- *Microbiology: Red blood cell, Neuron, DNA Strand, Influenza, Swine Flu, Bacteriophage*
- *Christmas Mirror*
- *Mind, Space & Art*
- *Build a Village*
- *Build a Story*
- *Additional Sketch Up-Tools: Magnifying Glass & Fly Through*

~~MSRP Cost: \$2,999~~

EAST Discounted Cost: \$2,199 (only \$439 a seat)

Optional /Upgrades

- *Set of 7 AR foam marker paddles*
- *Set of 5 Wide angle USB 2.0 video cameras*
- *Additional 5 seat license to ARDL Tool Kit Software*
- *Virtual Reality POV Viewing Interface w/ integrated video camera (requires a computer)*
- *Wireless Handheld AR Computer w/ integrated video camera*



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