



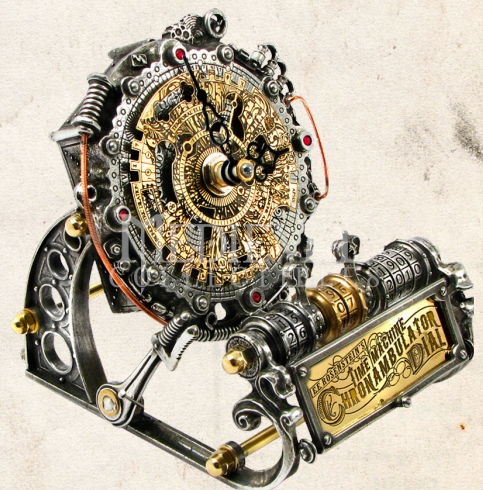
TEACHING IN THE 21ST CENTURY

Teaching in the 21st Century is not just about collaboration, access to the internet or the number of applications that are tried and tested in the classroom. Teaching in the 21st Century is about discovering innovative ways to create digitally rich interactive content.

These are the lessons that can inspire students to become engaged in their learning while interacting and creating content that they can warehouse for the future expansion of knowledge and share with others. These are the media rich assemblages of content that allow for deep learning experiences.

The methods used in designing a digital lesson have both a history and an array of ways to access and combine content into a complete seamless learning experience. Teachers who apply these design

methods will find that content no longer needs to be segmented and delivered in isolation but has the potential to be combined into a presentation that responds to an individual's touch to access content. This article is about how to design interactive content using multiple formats. These formats include interactive devices like whiteboards, tablets and cell phones.



GETTING STARTED

The graphic images placed throughout this article are triggers and are designed by using DAQRI 4D STUDIO and can be activated through an augmented reality application using DAQRI. To activate the augmented media embedded within this article, you should first download and print out the article. (See also PC viewing Option)



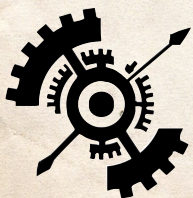
Secondly, you must download the DAQRI application on either your iPhone or iPad. Once you have downloaded the [DAQRI](https://itunes.apple.com/us/app/daqri/id421508232?mt=8) application, point your device at any image as you read through the paper and you will be provided with additional augmented reality demonstrations designed to enhance your learning experience. <https://itunes.apple.com/us/app/daqri/id421508232?mt=8>

You are now ready to view augmented content practice by holding your mobile device over a trigger image. The trigger image will activate a blue download bar by aligning the picture within the square and virtual content will appear on your mobile device..

The augmented media can also be activated from your PC by opening the article and then pointing a second device like a tablet or cell phone at any of the images.

<https://youtu.be/kkFM6HT4pnAv>

Digital **LEARNING** Design Hyperlinks to Augmented Reality



The emergence of application resources has enhanced the ability to create digital content through the use of mobile devices like tablets and smart phones. These applications and tools have now become a standard feature in every classroom. The internet has also brought about ways for teachers to collaborate and confirm the use of technology in the classroom. Through social networks and the creation of personal learning environments, teachers are seeking out 21st Century learning solutions in both design and confirmation of effective teaching strategies when using technology.

CREATING INTERACTIVE LESSONS

WHAT IS AN INTERACTIVE LESSON?



Designing digitally enhanced interactive lessons start with the assemblage of digital media sources. These digital media sources range from text, images, audio and video compilations that

are tied into one concept or idea. A graphic representation of the idea is supported by multiple resources that provide deeper meaning to the concept. These multiple resources are combined for the purpose of engaging the learner in various representational experiences that enhances the learning process. These representational experiences focus on the modalities of an individual's ability to decipher information from multimedia content that is both interactive and exploratory, allowing the individual to expand their own ideas for the construction and creation of future content.

Digitally designed lessons also support the ideas of learning modalities. The modalities of learning provide a representational experience as they focus on the learners interaction with the environment. These interactions should provide symbolic figurative occurrences that is representative of concrete episodes, abstract developments, or symbolic interactions. Designing digitally enhanced experiences around these modalities of learning is a powerful instructional component that can enhance a student's understanding and retention of information. Modality instruction is essentially the ability to integrate the diverse senses either in isolation or in arrangement to engage and reinforce the learning process. By the very design of the interactive format, a learner can cross over from rote memory to a world of creative expansion of newly constructed ideas of their own.

WHAT IS AN INTERACTIVE LESSON?

DIGITAL MEDIA SOURCES
designed to ENGAGE
The LEARNER IN VARIOUS
representational
EXPERIENCES



THE HISTORY OF INTERACTIVE MEDIA

Looking at the picture we can see that technology in the classroom has come a long way since the early 1970's. Educators would have to commandeer multiple electronic units from bulky video cameras, radio boom boxes, and VCR editing equipment to record on CD's or video tape. This type of multi component technology was less mobile, took multiple complex steps to develop, and multiple hours of production time.

"Technology today provides us one device with multiple applications. These single devices have powerful tools that allow the educators of today to try out different designs for presenting content. It is with these new content design opportunities that brings education to a new frontier of developing a science of education. Education will never be analytical science like physics or psychology nor has the theories of education brought much reform to the improvement of learning. The development of technology does provide the opportunity for education to become a design science that is more like aeronautics or artificial intelligence. "For example, in aeronautics the goal is to educate how different designs contribute to lift, drag maneuverability, etc. Similarly, a design science of education must determine how different designs of learning environments contribute to learning, cooperation, motivation, etc." (Collins, 1992:24). Technology is therefore both a tool and a catalyst; a catalyst that becomes a medium through which change can happen. Technology is a tool that enhances the medium to produce content for deep knowledge experiences .

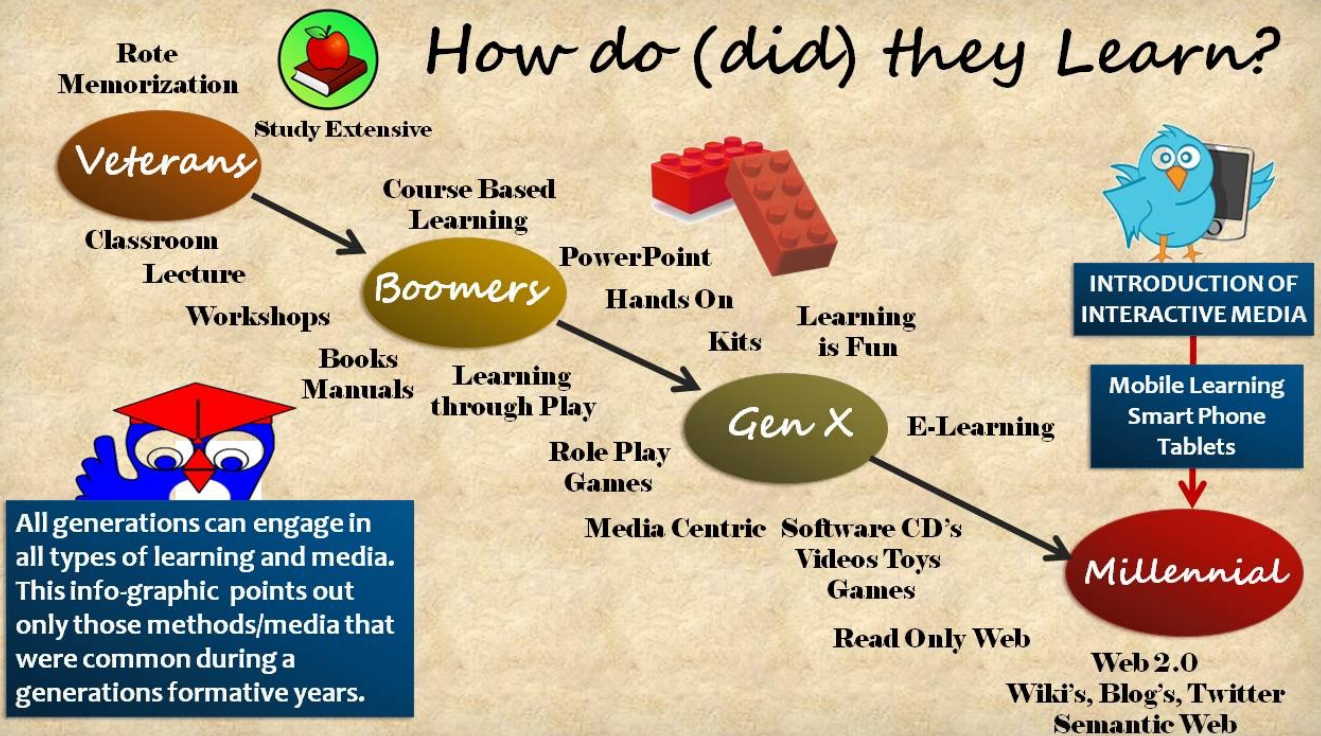


HOW THEY LEARN

In what ways might Net Generation learners differ from previous generations in how they think, learn, interact, and collaborate due to their experience with technology? In this slide we can see the reusable tools that were provided for each generation of learners and how they learned. Notice that in the top left hand corner of the diagram that veterans and boomers learned by extensive study, memorization, in classrooms, lectures, and workshops. The veterans and boomers are the primary source for today's teaching. A large number of veteran teachers who learned one way and have not grown accustom to a new generation of preferred learning.



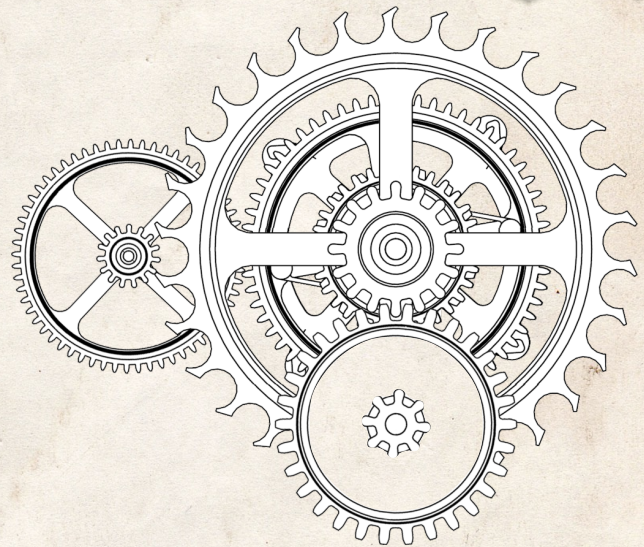
As technology tools evolve, more prevalent devices begin to emerge such as electronic course based learning, such as PowerPoint demonstrations. The technology gap widens with the Gen X generation. The newly invented Gen X tools are founded on the ideas of exploration, role playing games, and that learning is supposed to be fun. The Gen X generation spend hours of time consuming multiple media formats with interactive games. As we approach the millennial's we are discovering a new type of learner that prefers mobile devices that encourage interactive formats of social engagement.



WHY DIGITAL LEARNING DESIGN IS

Designing lessons today must be different from the ways teachers have designed lessons in the past. Over the last twenty years we have experienced a new generation of learners. Learners today are for the most part digitally literate. They have grown up with a widespread access to technology. They are living in the time of the Net Generation. A generation of students who are comfortable using technology. These are the millennial's.

The millennial's is a generation of students who have become visually literate and prefer to express themselves through the use of images. They are well versed in digital mash-ups and have learned to weave together images, text, and sound in a natural way. Their preferred learning structure has also changed. The Net Gen often prefers to learn and work in teams. A peer-to-peer approach is common, as well, where students help each other. They prefer structure over non-structured events. Kathleen Phalen states that the Millennial students,

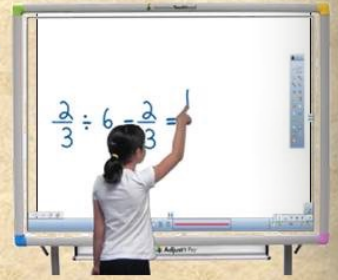


"They want parameters, rules, priorities, and procedures ... they think of the world as scheduled and someone must have the agenda" Their preference in learning is to be engaged. They want to be involved in inductive discovery or making observations. They are curious and have a drive to formulate hypotheses, to figure out the rules and to create. They have a craving for interactivity. This is the generation of learners that are reluctant to read large amounts of text and prefer visual images over text.

THE EIGHT LEVELS OF DIGITAL LESSON DESIGN

FIRST GENERATION INTERACTIVE TECHNOLOGY

- **Level 1: Hyperlinks**
- **Level 2: Embedding Hyperlinks into Presentations**
- **Level 3: Embedding Hyperlinks into Web Images**
- **Level 4: The use of Geo-codes KMZ Markers**



SECOND GENERATION INTERACTIVE TECHNOLOGY

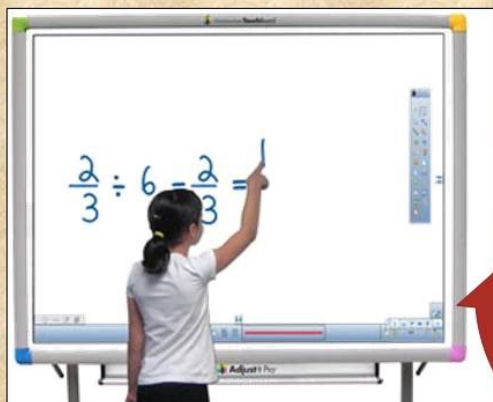
- **Level 5: Physical World QR Codes**
- **Level 6: Layer Augmented Markers**
- **Level 7: Marker less Geo Augmented Reality**
- **Level 8: Augmented Vision**



FIRST GENERATION INTERACTIVE SYSTEMS

The first generation of interactive systems came about in early 2000 with the interactive whiteboard, laptop and projector system. These interactive systems use touch applications tools such as embedded hyperlinks and sometimes the use of geo codes. Each of these applications that were used in the first generation of interactive systems can still be used today.

FIRST GENERATION INTERACTIVE TECHNOLOGY



Projector



**PowerPoint or Keynote
becomes software
application of choice.**



Laptop or PC

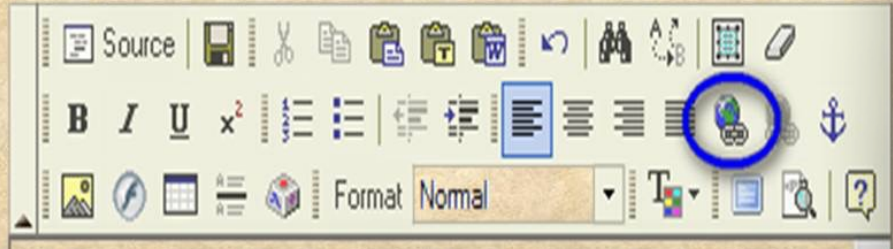
THE HYPERLINK

A hyperlink is an electronic link providing direct access from one distinctively marked place in a digital environment in a [hypertext](#) document to another resource hypermedia in a different location from the original document. A hyperlink is a graphic or a piece of text in an Internet document that can connect readers to another webpage, or another portion of a document. Web users will usually find at least one hyperlink on every webpage. The most simple form of these is called embedded text or an embedded link. To insert a hyperlink into text or an image you would just simply embed a reference url on the text or image that has a direct correlation to the topic. Hyperlinks are primarily used to access supporting content to a thought or idea.

LEVEL 1: THE HYPERLINK



A hyperlink is a graphic or a piece of text in an Internet document that can connect readers to another webpage.



When using a hyperlink to access supporting digital content you would first start with an overlay. You will experience this same type of formatting later on when using layering techniques in augmentation. The first step in designing an interactive learning experience begins with an image; an image that represents an overall concept, mood, or thought. What you will experience in the Inner Planetary Orbits image below is the early form of linking augmentation that can still be used today. Each object on the slide has additional content that supports interactive learning. Interactive content ten

years ago is that the had to be embedded into the root of the folder, called subfolders. The subfolders could hold different forms of content like documents, pictures, and videos. The objects are called targets and become interactive when they are used with hyperlinks. The presentation is layered out in sequence to the lesson by first introducing the moderator (Albert Einstein Avatar) and then the inner planetary system by clicking on a target icon. Today due to new technology like DAQRI Studio 4D the user can activate content over the target image.

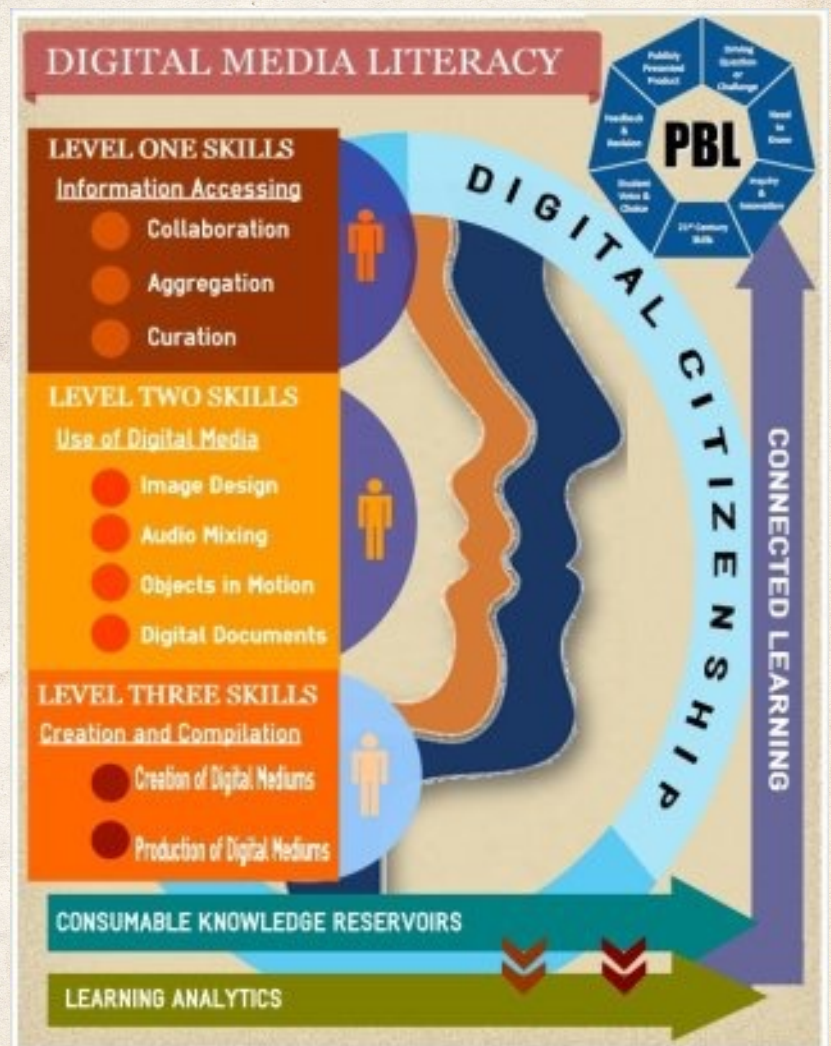
INNER PLANETARY ORBITS



THINGLINK

Thinglink is a good example of embedding content into symbolic form. **Education applications for ThingLink** could be used by a teacher to demonstrate the components of a model by using a tag. The tag represents interactive content that provides a deeper understanding of a model or diagram. There are multiple uses for embedding additional content into a model or presentation that ranges from maps to show historical facts, infographics to represent informational data, or to display steps in a solution to a problem.

- [How to Create Interactive Images Using Thinglink](#)
- [Add Colorful Pins to ThingLink Interactive Images](#)
- [Thinglink Introduces a New Image Discovery Option](#)
- [Add More to Your Images with Thinglink](#)



CREATING INFOGRAPHICS

This figure below provides a morphing transition on how to create an interactive image using PowerPoint as a format to upload to thinglink. To begin, there is a blank canvas as images are layered out into a sequence on how the content would flow by design.

Any image that has a hyperlink reference point can be embedded in an image using thinglink. An easy way to create an image to

upload to thinglink is to create format content on a PowerPoint slide. Once the multiple layer mash up has been created in PowerPoint you can convert the slide into a png or jpg file. This allows for the design of the image, as it would be presented in a lesson, using embedded content. Participants will learn how to create, convert, and upload an infographic image to thinglink and embed a series of concept related hyperlink resources for a deep learning



KMZ PLACEMARKS

Placemarks or special pointers indicate the existence of special locations. Special locations can include museums, shopping areas, famous landmarks, or leisure places among others. Both extension files are used to store images and data during other types of navigation purposes. This is often the

case. Users can easily do this by entering the area location into Google Earth and saving the data and image as a KML or KMZ file. The file is then transferred or uploaded into a mobile phone wherein Google Maps, another Google application, is also installed.

GOOGLE 3D MARKUPS AND VIRTUAL TOURS

The KMZ file becomes a virtual marker which can be uploaded as a reference file. After posting the file it will interact with Google Earth which reads the saved file in an online interface. The user can now use the saved information, like specific instructions on how to navigate and travel to a certain area. This geographical reference point is similar to an

augmented layer as it can be accessed to demonstrate various landforms or images specific to a location or region. These KMZ placemarks are useful in the classroom when viewing a location of a certain battle, economic regions, land forms, and places to visit in a virtual format.



SECOND GENERATION INTERACTIVE TECHNOLOGY

Mobile learning devices are intended to be versatile, motivating, and used as an active learning tool. Mobile learning technologies offer teachers and students a more flexible approach to learning. Tablets and cell phones are increasingly becoming the tools of choice for today's educators.

The iPad is among the more popular mobile learning devices. This device offers a tactile touch-screen that is easy for students to use and coupled with built-in Wi-Fi to access the Internet it becomes an interactive tool. Teachers who design lessons that fit within these touch applications are creating the expansion of resources that make learning interactive.

Mobile learning is considered to be the ability to use mobile devices to support teaching and learning. It is the 'mobile' aspect of mobile learning that makes it stand apart from other types of learning, specifically, designing learning experiences that exploit the opportunities that 'mobility' can offer us. This is because mobile devices have features and

functionality for supporting learners. For example, podcasts of lectures can be made available for downloading. Learners are expected to engage with these learning resources while away from the traditional learning spaces.

SECOND GENERATION INTERACTIVE TECHNOLOGY

THE MOBILE LEARNING DEVICE



PHYSICAL WORLD QR CODES

A QR Code is a two dimensional bar code which, when scanned using your camera phone, enables you to access some pre-written content or complete a task. It could be a facilitator to reading some text, accessing a web site, or sending a text message or an email. Once you have a QR reader app on your iPad, you can point your iPad camera at these codes and immediately grab useful information. A great resource for using QR codes in the classroom is the [QR Treasure Hunt Generator](#). The QR Treasure Hunt Generator offers a quick start resources to QR codes. The site offers ways to type out a series of questions and answers that can be used in a treasure hunt.

LEVEL 5: PHYSICAL WORLD QR CODES



- **A QR Code is a two dimensional bar code**
- **when scanned enables you to access some pre-written content or complete a task.**
- **Content must be stored online**
- **Content has to be referenced to a url or hyperlink**

QR CODE IMAGE APPEAL.

The physical world QR Code is not as attractive when placed on an image. In fact placing a QR Code on an image is a distracter. The QR Code still acts the same as a reference point for adding support content. The user can scan it for additional content but it looks much like a set of band aids that are stuck to the surface of a painting.

HOW TO USE A QR CODE GENERATOR

You can also create QR codes by using a QR Code generator like QR code Monkey. QR codes can be used to showcase examples of student work or a way to access content online. To access content you would first have to store the content online and then reference it to a url or hyperlink.

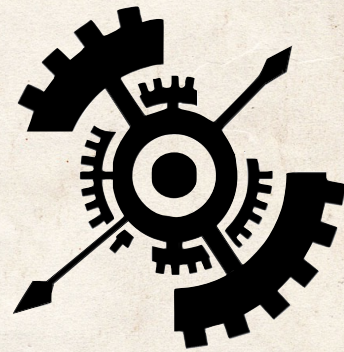
An example on how to store content online is to create and post a reading assignment that you would like your students to read before or during a class session. Once the assignment is posted you can copy the hyperlink (url) into a QR Code generator and then print the code to paper or post it for scanning.

QR codes can be used to showcase examples of student work or a way to access content online. To access content you would first have to store the content online and then reference it to a url or hyperlink. An example on how to store content online is to create and post a reading assignment that you would like your students to read before or during a class session. Once the assignment is posted you can copy the hyperlink (url) into a QR Code generator and then print the code to paper or post it for scanning. <http://www.mobile-barcodes.com/qr-code-software/>

CREATING LAYERED CONTENT

Augmented reality changes the educational landscape for it allows the designer of a lesson to embed interactive content into a new learning space where images come to life through 4D experiences. The use of augmented reality will have an impact on deep learning with potentials in increasing academic engagement, keeping students captivated in real time experiences of sound, and visual images. Through innovative programming, like DAQRI 4D Studio lesson designers can harvest the power of interactive content by constructing targets used to trigger digital content. Developers can use various multimedia information sources like videos, images or sound files to

render content to mobile devices in and around a school campus. Augmented reality applications for mobile devices like DAQRI 4D studio are destined to provide new avenues for ways to share digital content in these new learning environments. The potential to create virtual field trips, and ways to interact with layers of content within social networking communities will revolutionize learning within the next few years.



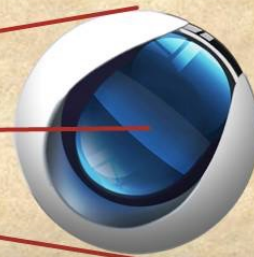
LAYER AUGMENTED MARKER

INTERACTIVE IN REAL TIME

Registered In 3D

REAL & VIRTUAL WORLD ASPECTS

ENHANCES ONE'S PERCEPTION OF REALITY



AVATARS IN AUGMENTED REALITY

Avatars can be used by classroom teachers when designing digital stories or delivering content. Avatars can represent a tour guide explaining travels along the Silk Road, or represent real life characters like Mark Twain giving a lecture on his home or presented in a museum format representing famous characters. Most avatars are known as "bots" and are powered by Natural Language Processing. Some avatars like Crazy Talk allows users to record natural voiceovers along with secondary sound recording like music.

When incorporating avatars into digital learning design they can be used to define terms, give directions to an activities or reinforced content. Avatars can also be integrated into a thinglink image, or incorporated into a collaboration website using augmented reality.

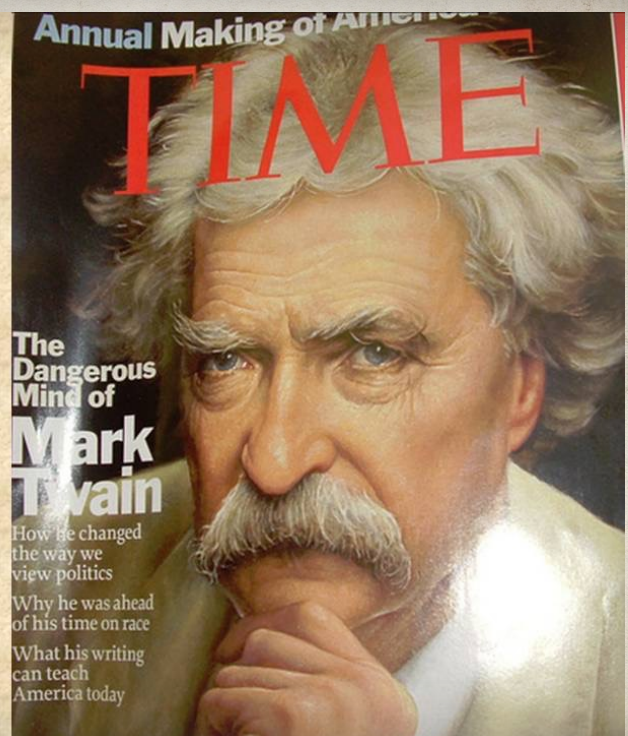
Students can also use Avatars as they make presentations that are supported by media

based technology as they post authentic assignments to a collaborative website. Creating avatars is a great way to have students learn vocabulary, practice their writing skills, develop character sketches and construct storyboards.



LAYERED CONTENT
DΔQRI 4D
Studio

SEE AVATAR CREATION
Using Crazy Talk Software



POSTING LAYERED CONTENT ON LOCATION

One way to use augmented reality would be to post virtual content by taking a photograph on location of an existing sign or structure. To create a virtual field trip that contains information of a location, a designer would want to establish multiple layers by creating several picture targets of the area and establish them with geo-locators. A picture target is what activates the content on your mobile device when holding the device like a cell phone over the image. Just recently, while living in the historic town of Dodge City, Kansas, I created a picture target of a sign located at the Boot Hill Museum. The sign pictured to your right can be used as a target for anyone who now visits the museum. The picture target will activate a digital story of an actual historic event of a gunfight between Ed Masterson and Jack Wagner.

**Create a Digital
Story Create
Several Picture
Targets of an Area
Picture Target Is What
Activates The Content
On Your Mobile Device**



POSTING VIRTUAL CONTENT ON LOCATION

WHY AR IN EDUCATION

- Provides rich contextual learning for individuals learning a skill
- Appeals to constructivists' notions of education where students take control of their own learning
- Provides opportunities for authentic learning and appeals to multiple learning styles
- Has the power to engage a learner in ways that have never been possible
- Can provide each student with his/her unique discovery path
- No real consequences if mistakes are made during skills training.



SPACECRAFT 3D

NASA's Spacecraft 3D is an augmented reality (AR) application that lets you learn about and interact with a variety of spacecraft that are used to explore our solar system, study Earth, and observe the universe. Using a printed AR Target and the camera on your mobile device, you can get up close with these robotic explorers, see how they move, and learn about the engineering feats used to expand our knowledge and understanding of space. Spacecraft 3D will be updated over time to include more of the amazing spacecraft that act as our robotic eyes on the earth, the solar system, and beyond! Please look forward to interacting with even more iconic NASA missions in future updates!



AUGMENTED VISION

ARMedia Player™ is the first iOS application that allows to interact with virtual models, created by means of the popular ARMedia Plugins, directly in the real physical space using AR (Augmented Reality) technology. When aiming your device's camera to the AR target image, you can simulate the setup of your models in an unrestricted way and interact with their features no matter where you are.



**DOWNLOAD SPACECRAFT 3D
AND POINT DEVICE AT TARGET**

This way, models come to life letting you enjoy an immersive experience of the virtual models in your surroundings. The software is a general purpose player suitable for studying virtual prototypes of any kind in physical locations. In addition, it is a unique tool for presenting projects and ideas in many fields including Design, Architecture, Engineering, Construction, and Education.

http://www.inglobetechnologies.com/en/new_products/arplayer/info.php

AUGMENTED VISION



The virtual augmented reality experience will soon be enhanced by augmented visual assistance like AR glasses. AR glasses is a wearable computer with an optical head-mounted display (OHMD) that is being developed by an assortment of companies like DAQRI. Currently augmentation can be experience through some mobile devices but as technology advances, augmentation will be available through Smartphone-like hands-free format that can communicate with the Internet via natural language voice commands or by virtual targets. To advance our knowledge in virtual experiences, AR eyewear will enhance multiple walk around environments like museums. To demonstrate how third generation AR developments can be used in a Museum type environment go <http://epubgeneration.weebly.com/augmented-reality.html#.Uj30W4asgmE>

AUGMENTED



games
Turn the real world into a playable racetrack with Tabletop Speed!