Virtual Reality: New Frontiers in Education

TechEd Chicago

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"By using VR in education abstract material now considered too difficult for many students and taught even to advanced learners only at the college level could be mastered by most students in middle school and high school."

-NASA Software Technology Branch

Virtual Reality In Education

Virtual reality (VR) can be described as a cutting-edge technology that allows students to step *through* the computer or television screen into a three-dimensional, computer-simulated world to learn.

Virtual Reality In Education

- VR places students inside of a simulated environment that looks and feels like the real world.
- Students interact in VR like they interact with the real world- objects can be picked up, turned around, examined from all angles.

Virtual Reality

- At the heart of VR is an experience
- The learning potential of VR is great because it is “learning by doing”
- Learning requires a first-hand experience to understand- words, pictures, and videos are not enough

VR Headset

- Lets us see new views of virtual worlds as we turn our heads
- Three-dimensional depth perception is created by “stereoscopy,” where slightly different views of the same image appear to each eye.

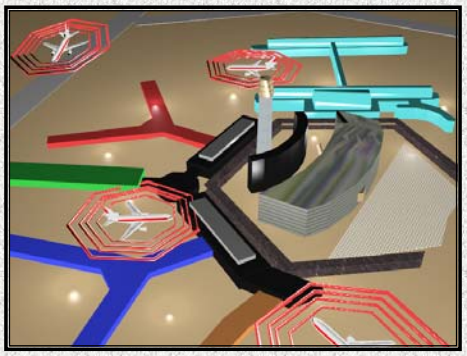
VR Glove

- Students see their hand in the virtual world, enabling them to pick up and manipulate objects
- Provide a new, natural way to interact and communicate with the computer

Head Tracking

- A tracking mechanism registers any head motion by the student.
- When a student moves her head, the scene changes accordingly, just as in real life

3-D Stereo Sound



- Recognizing objects in the virtual world through 3-D sound greatly adds to the realism of the VR experience.
- The volume of an airplane in a virtual world decreases as it moves away from you, just as in real life.

Why VR is possible today

1) Improved CPU performance
2) 3-D graphics accelerators
3) HMD price/performance
4) Consumer markets

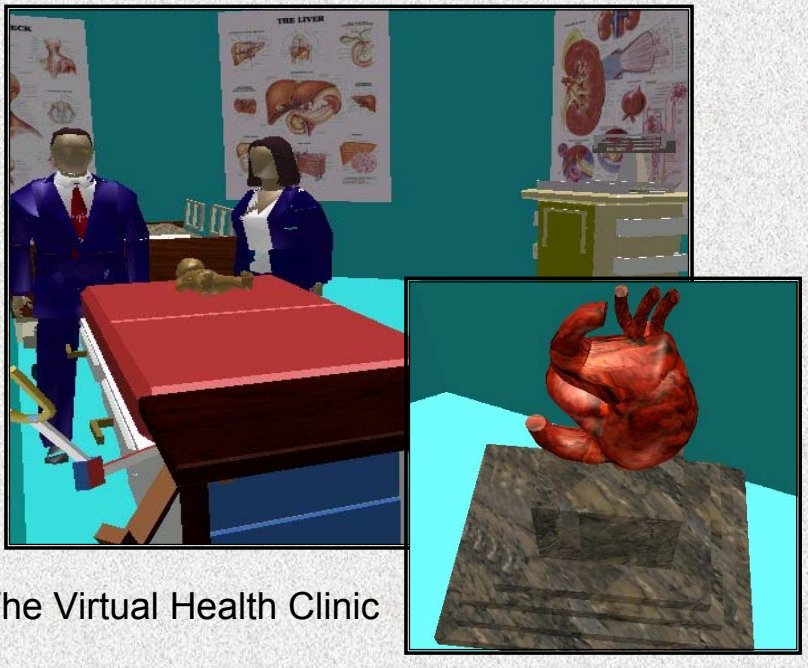
Virtual Health Clinic

- World's first educational VR lab
- Malcolm X College teachers designed the Virtual Health Clinic in cooperation with SUNRISE Virtual Reality
- ✓ Faculty brought ideas which were than tested for technical feasibility
- ✓ Faculty ideas became 3-D scenarios
- ✓ Faculty took SUNRISE personnel on lab tours taking hundreds of digital photographs to create a fully functional, 3-D health complex

Malcolm X College In Virtual Reality

The Virtual Health Clinic

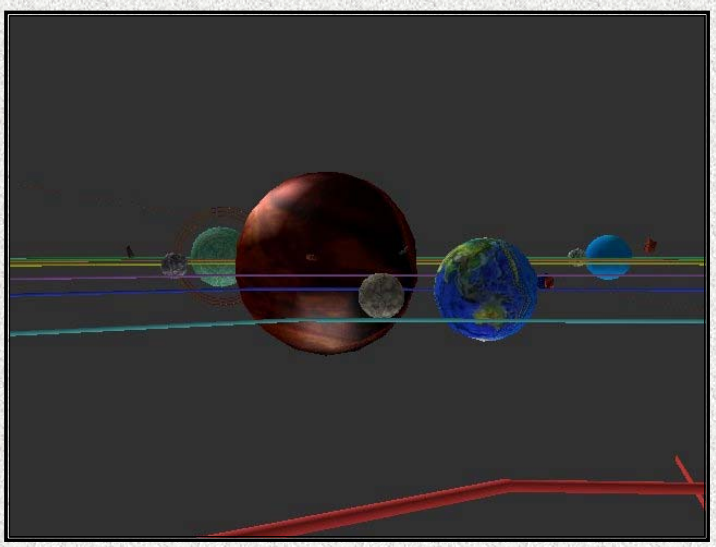
- The virtual health clinic allows students to diagnose and treat virtual patients with a variety of symptoms
- The program is divided into five virtual environments or rooms
- Patient scenarios are generated at random



The Virtual Health Clinic

The Virtual Health Clinic

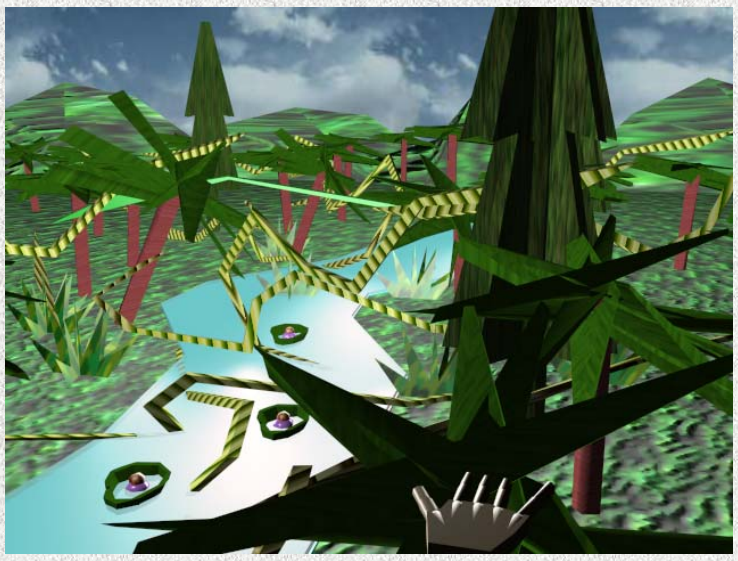
- For each patient, there are 20-30 options
- Students must navigate mentally through options and determine correct treatments, tests, and dosages
- When students have a question about a body part, organ, or system, they use a 3-D reference room with anatomical models and physiological systems



The Virtual Solar System

Understanding Virtual Reality

- Think of a child exploring a forest for the 1st time.
- A child will best learn about the forest not from reading or listening, but by walking into it and becoming a part of it.
- The child is free to explore the forest any way she likes.
- Discovery and experience are the best teacher.



The Amazon Jungle in Virtual Reality

Unlimited Choices in VR

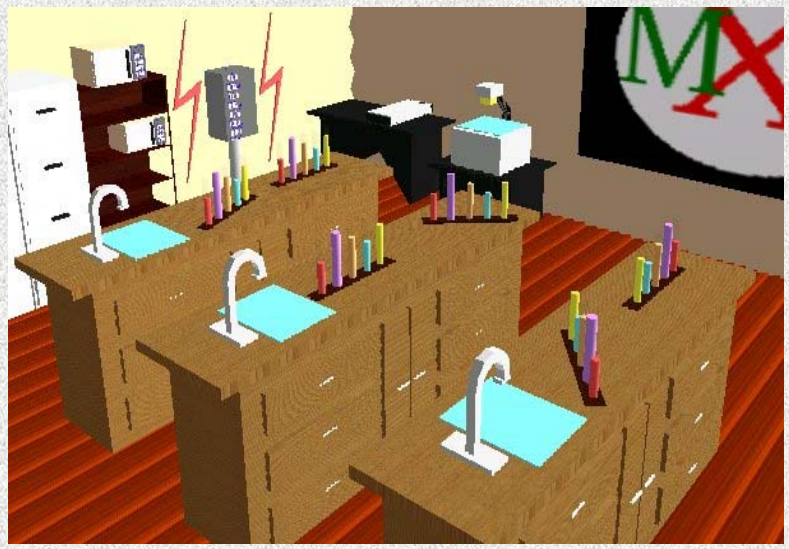
- Students make real-time decisions
- Students can fly, drive, swim, or walk anywhere
- The number of possible combinations of real-time interactive choices available are infinite
- No matter how many choices are pre-computed, there are always more possibilities available
- Not possible with other computer programs since the images have been previously generated

Engaged Learning

- VR is based on “Engaged Learning”
- Students explore bodies of knowledge
- Students control learning process
- Students carry out “authentic tasks”
- Teachers use VR to create environments for exploration and experientation

Education Philosophy

- A shift from text-based education to multi-sensory, experiential learning
- Copies the way that students best learn- by interacting with the world
- Instead of teaching rules about a subject, students “travel” to a virtual recreation- they are “there”

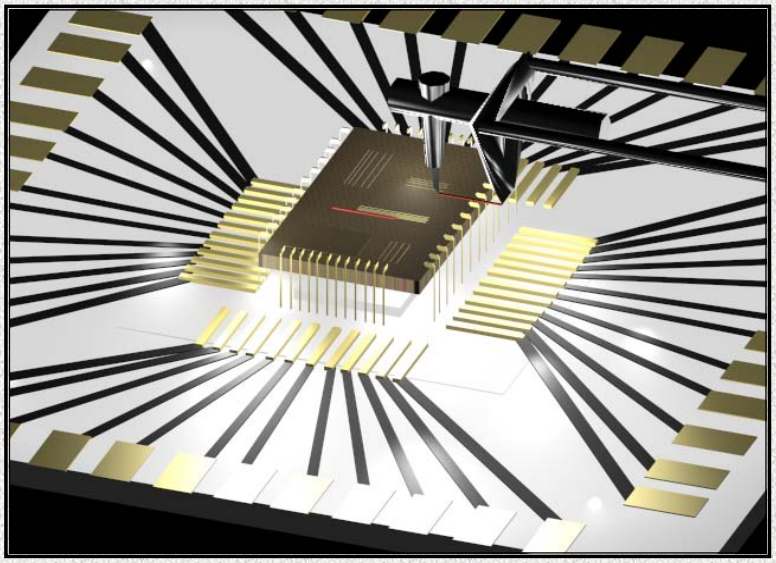


Students experiment in a virtual lab

Experiential Learning

"I hear and I forget. I see and I understand. I do and I remember."
–Confucius

- Learning is more effective when it is an active discovery process, rather than passive
- Students learn more when they control learning
- Learning is most effective when thought and action are integrated
- The more realistic the learning, the more effective it will be as an educational device

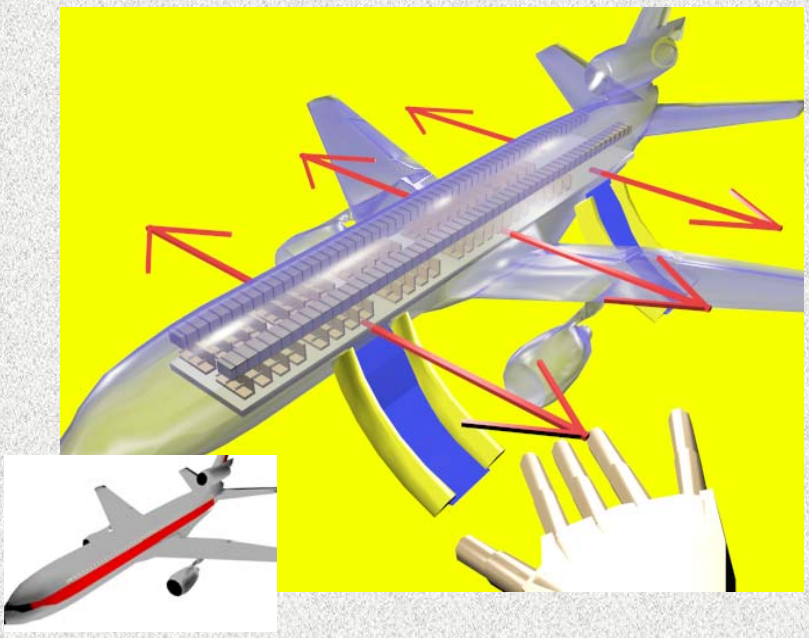


Technology Education in Virtual Reality

Visual Learning

"The eye- it cannot choose but see."
-Wordsworth

- The human being is a very visual creature
- We accept visual messages very quickly
- Most of the information we receive come from visual images because it is simply the most effective and natural way for human being to process information

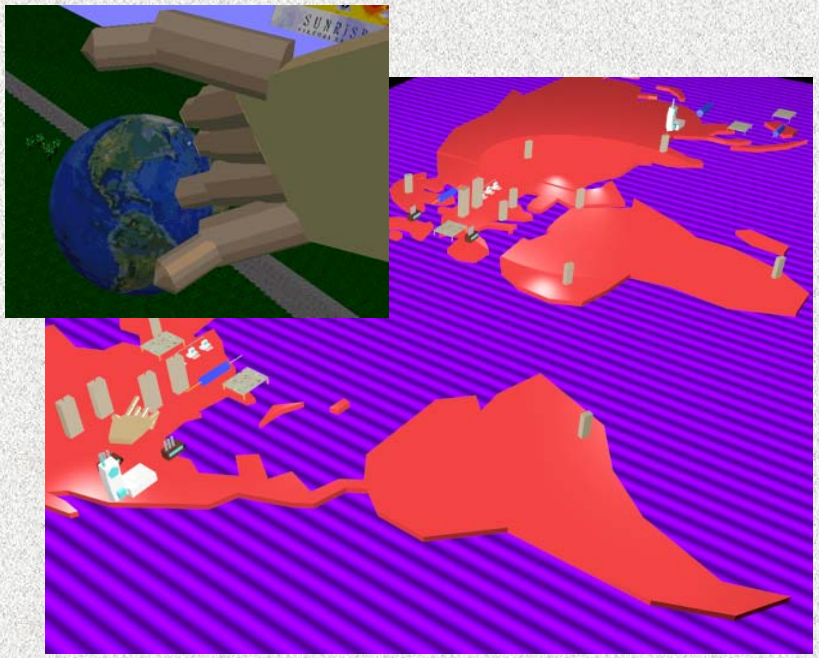


The Virtual Constitution: Inside Independence Hall

Virtual Trip to Mayan Pyramids

Virtual Reality and Students

- The age old problem: how to better involve students in their studies
- New ways must be found to engage students
- The videogame era has changed students' attention spans
- Students have a great natural interest in VR



Virtual Reality and Teachers

New teaching methods must be pioneered to relieve growing burdens on teachers

- ✓ Teachers assist and guide while students explore and discover
- ✓ No distractions in the learning environment when students have VR headset on
- ✓ Students are focused on learning

Curriculum Integration

VR programs are modularly and flexible

- ➢ Integrated into existing curriculum learning in three ways:

  1) Supplementary Education Vehicle

  2) Primary Education Vehicle

  3) Study Aid

VR: Curriculum Integration

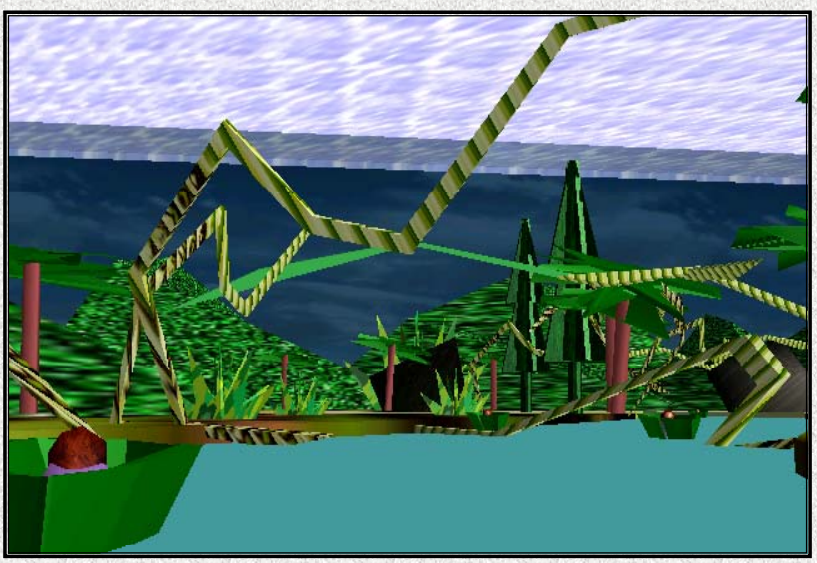
- ✓ VR Programs are aligned to state and national standards
- ✓ VR learning goals are explicitly stated in supplementary materials
- ✓ Teachers select VR programs to complement curriculum plans
- ✓ Learning goals and sub-goals are easily identified

Virtual Reality Learning Lab

- ➢ Similar to existing computer and language labs: 25 VR workstation
- ➢ Each class in the school uses VR to supplement traditional instruction
- ➢ Students have lab access during study periods, before school, and after school for clarification, projects and independent study

The Virtual Cell

Shakespeare's Globe Theater



Grammar Treasure Island

VR Costs

VR is now based on off the shelf PC's: every school can now afford to use it

✓VR Headsets	$500 - $1,300
✓PC	$500
✓Graphics Card	$140
✓VR Glove	$130

VR Pilot Schools

Creative schools needed for Pilot Program

- First of its kind in the world
- Schools use a full selection of VR programs
- Pilot Schools Program will focus on 3 areas:
  1) Establishing the VR lab
  2) Integrating VR learning into the curricula
  3) Measuring the impact of VR on learning

Sign up at www.sunrisevr.com

Virtual Reality Education Programs

Mathematics Fundamentals Pre-Algebra Algebra Geometry	**History/Social** U.S. Constitution U.S. Geography World Geography Environmental Studies Virtual Chicago	**Science** Earth Science Physics Chemistry Biology Virtual Solar System
English Parts of Speech Shakespeare's Globe Theater **Technology** Inside the Computer The Internet	**Black History** 1963 Civil Rights March on Washington Underground Railroad	**Language/Travel** Pyramids of Mexico Ancient Egypt **Cognitive Skills** Critical Thinking Study Skills Memory Skills