# Virtual Reality and the School Library/ Information Skills Curriculum

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Virtual reality (VR) is a computer-generated simulation of a real or imaginary environment with which the user can interact and manipulate. Virtual reality, with the potential to change the way students learn in the school setting, can play an important role in the school library/media skills curriculum. The purpose of this paper is to describe some of the ways VR can be used in this curriculum.

Three applications for VR in the learning process have been identified by Ferrington and Loge.[1] Visualization, the manipulation and rearrangement of information spatially and temporally so it can be easily understood, is of primary importance to the information skills instructor. Simulation of the real world or imaginary or constructed phenomena is a second application. Third is the development of participatory environments and activities that can exist only as computer-generated worlds. All three applications can be used in the media skills curriculum.

Currently, VR can be divided into two broad types, text-based and graphics-based. Graphics-based VR uses 3D visualization software to create a virtual environment or world with which the user can interact. This world can be a faithful rendering or a simulation of the real world or of an imaginary one. Text-based or network-based VR uses virtual environments that are created by participants in multi-user domains, or MUDs, accessed through networks such as the Internet. Creative writing skills are honed as users create a simulated environment or world. Participants in the MUD may be from around the globe or in a single classroom. While both types of VR can be used in the media skills curriculum, graphics-based VR is the type discussed in the remainder of this paper.

## Reasons to Use VR

There are numerous reasons to use graphics-based VR in teaching. First, VR provides motivation in a way that no other medium can. VR can illustrate some features and processes more accurately than other means. VR allows both extreme closeup examination of an object and observation from a great distance. It allows the disabled to participate in an experiment or learning environment when they cannot do so otherwise. It gives the opportunity for insights based on new perspectives. It allows the learner to proceed through an experience at his or her own pace. It allows the learner to proceed through an experience during a broad time period not fixed by a regular class schedule. It provides experience with new technologies through actual use. Since VR requires interaction, active participation rather than passivity is encouraged.

VR can be used wherever a simulation would be used. For example, when teaching or training using the real thing is dangerous (injury to learner and/or instructor is possible), impossible (necessary environment cannot be experienced in the real world), or inconvenient, VR can be a viable teaching alternative.

VR also can be used when mistakes made by the learner or trainee using the real thing could be devastating and/or demoralizing to the learner, harmful to the environment, capable of causing unintended property damage, capable of causing damage to equipment, or costly.

Other reasons for using VR in teaching and training include situations in which

- A model of an environment teaches or trains as effectively as the real thing;
- Interacting with a model is as motivating or more motivating than interacting with the real thing, e.g., using a game format;
- Travel, cost, and logistics of gathering a class for training make an alternative attractive;
- Shared experiences of a group in a shared environment are important;
- The experience of creating a simulated environment or model is important to the

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learning objective;

- Information visualization is needed (manipulating and rearranging information, using graphic symbols), so it can be more easily understood;
- A training situation needs to be made "real," e.g., practical experience under realistic conditions;
- The imperceptible needs to be made perceptible, e.g., using and moving solid shapes to illustrate clashes of ideas in group processes;
- Participatory environments and activities that can only exist as computer-generated worlds are needed;
- Tasks involving manual dexterity or physical movement must be taught;
- Learning must be made more interesting and fun; e.g., working with boring material or with students who have attention problems.

## Uses of VR in the North Carolina Competency-Based Curriculum

One of the projects of the Virtual Reality and Education Laboratory (VREL) in the School of Education at East Carolina University involves a study of the North Carolina Competency-Based Curriculum objectives to identify those that can use virtual reality as a measure or means to attainment.[2] To this end, objectives are scrutinized and compared with the capabilities of various VR software programs, primarily at the less expensive end of the cost spectrum. At the same time, research on educational uses of VR and reported educational and training uses are studied as they are identified in publications, at conferences, and in the VR discussion groups (listservs) on the Internet. Many additional uses have been identified as a result of personal communications received from the electronic distribution of VREL's bibliography, *Virtual Reality and Education: Information Resources;*[3] from readers of the author's publications, *Robotics in Education*[4] (which includes information on telepresence) and "Virtual Reality in the Classroom,"[5] and from suggestions of students in Computers in Education and Virtual Reality classes taught at East Carolina University.

In the *North Carolina Standard Course of Study*, the *Teacher Handbook: Information Skills/Computer Skills K-12* states that the Information Skills Curriculum "emphasizes critical and creative thinking, problem solving, decision making, collaborative learning, and the importance of integrating information skills into all other curriculum areas."[6] The *Teacher Handbook* is organized around competency goals, with subsidiary objectives, focus areas and

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### Specific Examples of the Use of Virtual Reality with the North Carolina Information Skills Curriculum

**Competency Goal 1:** The learner will experience a wide variety of reading, listening, and viewing resources to interact with ideas in an information-intensive environment.

**Objective 1.1:** The learner will explore reading, listening, viewing sources and formats.

**Implications for Learning (Grades 3-5):** Introduce computer software and other technologies that encourage and motivate students to read, listen, and view.

*Providing the student with different VR software opportunities will allow him or her to explore a computer software format that is hightly motivating.*

**Objective 1.4:** The learner will relate ideas and information to life experiences.
**Focus:** Collect information about diverse cultures, environments, and people. Relate similarities and differences to personal life experiences.

**Implications for Learning (Grades K-2):** Students read a book about children around the world going to school. One of the activities is to list similarities and differences observed while reading the book.

*Using VR, students could draw and furnish the school buildings and interiors described in the book, and walk around outside and inside each one. They can gain an impression of how it might feel to go to school there, compared to going to their own school. New insights about differences and similarities, unattainable through reading, can be gleaned.*

**Implications for Learning (Grades 6-8):**

- Learning about Ourselves in the World Community
  — Develop a questionnaire and collect curlural information about the entire class, such as church affiliation (Methodist, Baptist, Jewish, etc); family configuration (mother, father, # of brothers, etc.); housing (house, apartment, condominium, mobile home, etc.); customs, holidays traditions.
  — Produce a video that captures the class culture and exchange with another class.

*A VR environment illustrating aspects of the class culture, such as housing or holidays, could be drawn and exchanged with another with another class. Using two computers or video players side by side, students could compare class cultures, screen by screen or frame by frame.*

**Objective 1.5:** The learner will communicate reading, listening, and viewing experiences.
**Focus:** Produce media in various formats based on reading, listening, viewing experiences.

**Implications for Learning (Grades 3-5, 6-8, 9-12):** "Following various reading, listening, viewing activities, communicate what you have experienced by producing one or more of the following: [a wide variety of media is listed with which to 'design/construct, create/compare, perform/present, or write/compute']."

*Using VR software, the student can design a virtual environment illustrating an experience with which others can take a prerecorded walk to reenact the experience, or which others can modify to see how alternative interpretations change the experience.*

**Competency Goal 2:** The learner will identify and apply strategies to access, evaluate, use, and communicate information for learning, decision-making, and problem-solving.

**Objective 2.1:** The learner will explore research processes that meet information needs.

**Implications for Learning (Grades 9-12):**

- Locate, interpret, and present statistical information.
  — Deveop tables, charts, graphs (bar, picture, circle) or games from statistical information.
  — Present the information using computers, posters, overhead transparencies, or other visual resources.

*Using VR, the student can draw three dimensional objects to scale according to the size of the statistical information. Different colors, shapes, and locations can be used to differentiate between types of data. The user can then walk among the data objects to get a feel for size differences. Visualizing statistical data is already a feature of some VR systems used in stock market data analysis.*[9]

**Objective 2.2:** The learner will engage in a research process to meet information needs.

**Implications for Learning (Grades K-2):**

- Media Coordinator/teacher coordinate(s) the development of a product by students.
  — Support students in presentation of information, as they:
    - Draw a picture
    - Make a model
    - Write a story
    - Create a dramatic presentation

*Students can use VR software to make a model of an object that they have researched to communicate to others how that object looks, its color, the environment in which it is found, and other attributes.*

implications for learning. The two competency goals for the Information Skills Curriculum are

> Competency Goal 1: "The learner will experience a wide variety of reading, listening, and viewing resources to interact with ideas in an information-intensive environment."[7] (Includes five objectives.)
>
> Competency Goal 2: "The learner will identify and apply strategies to access, evaluate, use, and communicate information for learning, decision-making, and problem solving."[8] (Includes two objectives.)

VR can be used either as a means of attainment or as a measure for a number of the objectives detailed under the two competency goals. Wherever students can illustrate information with pictures or graphically, wherever a comparison of pictures based on information gathered is required, or wherever a simulation can be used, VR will prove useful. (See sidebar.)

## Examples of VR Software Currently Available

Desktop VR software, e.g., software that requires no special equipment other than a microcomputer, is available at affordable prices. One of the most useful pieces of VR software for the school media center is Virtus WalkThrough.[10] This desktop VR allows the user to build anything that has volume and then walk through what has been built. The screen of Virtus WalkThrough is divided into a 2D drawing side and a 3D rendering of what is drawn. Since everything drawn has volume, even the leg of a chair can be entered. A large number of already drawn objects, as well as some VR models, come with the program. Others are available via FTP (file transfer protocol) from sources on the Internet. This VR software can be used to draw rooms, homes, boats, buildings, and even molecules, and can also be used to draw models for visualization of statistical data.

Virtus WalkThrough was originally developed for architects, but has found wide acceptance in many fields, such as urban planning, theater production, and retail merchandising. There are several versions, including ones for both the Macintosh and PC-compatibles using Windows, Virtus WalkThrough Pro, and Virtus VR. Reviews have appeared in *PC/Computing*[11] and *Macworld*[12] as well as other magazines.

Another useful desktop VR program is Virtual Reality Studio 2.0.[13] The user draws the VR environment and walks through in the same screen area. This VR software can be used to build 3D animated objects with which the user can interact. It also supports sound cards for interactive sound. A library of clip-art objects comes with the program. Like Virtus WalkThrough, Virtual Reality Studio 2.0 is available in a version selling for less than $100.

A third VR software program that can be used for teaching media skills is VREAM.[14] VREAM ("virtual dream") is somewhat more expensive but supports all manner of VR equipment such as gloves (that allow the wearer to "reach into" the virtual world to manipulate objects), head-trackers (devices that track the position of the head), and head-mounted displays (helmet- or goggles-based devices that include a tiny video monitor mounted in front of each eye to create a 3D image). Elaborate VR environments with which the student can interact can be built.

No computer programming skills are required to use any of these VR programs, making them ideal for school use. Students can use the models and objects that come with a program, modify objects and models, and draw their own. All of these VR programs provide endless opportunities for creativity, exploration, understanding, communication, and learning.

## The Future

There will be many uses for VR in teaching information/media skills in the future. Four possible uses include: students building an entire library/media center, with animated students and media personnel, that allows them to interact and role play in the environment without risk of social or psychological harm; students building a model of an existing media center to try out, by moving furniture and fixtures around, suggesting changes to the physical facilities that might enhance its use; students trying out various types of interaction with media personnel and reference sources to discover which most effectively gives them the information they are seeking; and computers automatically matching any learning objective with an appropriate VR environment for the instructor's use.

Information can be visualized routinely using different shapes, colors, sizes, and movements, for clarification and better conceptualization. Using VR to immerse the student in the information will be a new service level for reference and research. Information thus symbolized, manipulated, and experienced might uncover new relationships, and perhaps even lead to new knowledge.

Reading and interpreting a story or play will be augmented with virtual reality. Dan Barron[15] suggests that, using VR, instead of viewing the flatland film, students studying Shakespeare could actually go to the Globe Theatre or to New York and see full-sized images of professionals presenting the plays.

VR will become an integral part of the school library/media skills curriculum in the future. Using VR programs already available, we can begin enhancing media skills now.

***References***


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[6] North Carolina Department of Public Instruction, *Teacher Handbook: Information Skills/Computer Skills K-12.* (North Carolina Department of Public Instruction, Division of Curriculum and Instruction, 1992), 3.

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[8] *Ibid.*

[9] vrTraderTM (Avatar Partners).

[10] Virtus Corporation, 117 Edinburgh S, Suite 204, Cary, NC 27511.

[11] Wendy Taylor, "Virtus's Incredible Walkthrough: Virtual-Reality-Based Drawing," *PC/Computing* 6 (September 1993): 60.

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