Virtual Harlem in the Beginning:
Retrospective Reflections

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My inspiration for the Virtual Harlem project came from many sources, beginning with Jessie Fauset, a major figure in the Harlem Renaissance. Her under-representation as a writer and critic of the early twentieth century drew my interest. I developed an appreciation for her writing, her background, and her criticism of the period we now know as the Harlem Renaissance through several graduate seminars in African-American literature at the University of Missouri-Columbia (UM). Fauset's keen interest in the notion of "passing," although she could not do so herself, fascinated me. Her writing encourages alternate interpretations that can be associated with the term, suggesting that she was "passing" in other ways.

In 1996, an article was published in the Missouri University (MU) Faculty Newsletter about a new organization on the MU campus that was experimenting with advanced visualization and multimedia for use in the classroom. The director of the Advanced Technology Center (ATC), Bill Plummer, said that they were primarily interested in virtual reality (VR), and were soliciting proposals from faculty members to initiate projects using this new technology. I submitted a proposal to create a VR representation of Harlem, New York, as it existed during the 1920s to use as visual support for classes I taught on the Harlem Renaissance. The goals of this project continued to expand as I learned more about virtual reality and was intrigued by the possibility that it increased student comprehension and learning. These goals, which are still relevant to the project, include: fostering curricular and pedagogical reform, making more productive use of networking resources, incorporating advanced technologies, developing a national and global dissemination plan, and designing relevant curricula within several disciplinary areas for use within a VR learning environment. While researching VR technology and the ways other universities were using it, I discovered that UM was one of only a handful of universities developing the use of virtual reality for the classroom, and among an even fewer number using it in American Literature courses.

The Virtual Harlem project allows students not only to visualize

a historical context of the Harlem Renaissance, which is the setting of several fictional texts, but it also enables them to navigate through streets, to interact with historical characters (through questions and audio cues), and to participate in its design. When students "build" the setting for their readings, their enthusiasm for research increases.

To date, approximately ten square blocks of Harlem, NY have been reconstructed in a virtual reality-learning environment. This environment gives students an unprecedented view of the cultural wealth and history of one of the most productive periods in African-American culture—the Harlem Renaissance, circa 1921-1930. Currently, research materials contributed by students help to refine and expand upon this base. Students not only do interdisciplinary research on the time period but also see its results in Virtual Harlem, providing new dimensions to their understanding of the Harlem Renaissance. Learning of this sort is only possible in a virtual environment because the goal of Virtual Harlem is to simulate the real-world situations and settings that no longer exist in the forms they had during the 1920s and 1930s. Historic figures are no longer living, buildings have been torn down, moved, or have decayed to the extent that they are no longer recognizable, and the style of dress and use of language has changed over the years. It is anticipated that by placing users in the context in which a work of art or literature was created that their research will be more comprehensive. The Virtual Harlem environment is not, at this point, an exact replica of the Harlem landscape. There are several representations of cultural landmarks like the Savoy Ballroom, the Apollo Theater, The Theresa Hotel and others that have been recreated based on black and white photographs. The immediate area surrounding these landmarks is accurate. There are plans underway to revise the current environment to reflect a more historically accurate rendition of Harlem of the 1920s and1930s. This redevelopment will include higher resolution images and textures, more realistic figures, higher quality audio, and the incorporation of video and animated figures.

Virtual Harlem: The Experience

The Harlem Renaissance, circa 1925-1935, is the major context for this virtual reality-learning environment. A student studying literature may encounter an experience similar to the one described below.

As the journey begins, a passing trolley car full of people must be avoided, as well as other Model-Ts parked in the street. Straight ahead, the Lafayette Theatre is an obvious attraction, with an all black cast playing in the version of *Macbeth* produced by Orson Wells. From the open car, you can hear the sounds of dogs barking in the streets and people laughing and walking by. Getting out of the car, you can stop and hear a portion of Macbeth's infamous monologue as he holds his bloody dagger, while the cast practices during the day. Driving is the fastest way to get your bearings in

Harlem, but walking will take you into the clubs to watch live per-
formances of jazz, blues, ragtime, and classical music. The
Bamboo Inn, home of jazz improvisation, and the Corner Bar,
which was an interracial club, are among the many establishments
and visible storefronts that were created using photographs as a ref-
erence.

Navigating through the streets by day, you notice the entrepre-
neurial life of the city streets. You can pass street vendors selling
their wares, and as you approach one he will start to call out his
jingle, "the meat pie man is a mighty fine man." These jingles or
street-chants were a popular form of entertainment, and are the ori-
gin of the later commercial jingle. Walking also allows you an
opportunity to explore Harlem's alleyways, where you might hap-
pen upon two men playing checkers or telling "hoodoo" stories,
which are the U.S. version of "voodoo" and involve the sharing of
herbal recipes, love potions, trickster tales, or other kinds of spiri-
tualisms. As students hear these stories, the instructor can tell them
of the history of American "hoodoo," a kind of folklore that was
developed by slaves to accommodate their new surroundings. The
voices of all the characters within Virtual Harlem are those of actors
that were recorded and placed in the appropriate location as
"sound beads" within the environment. In time, we hope to incor-
porate "live" actors who will be filmed using chromakey technolo-
gy and place them as animated figures within the project which
will come to life when one approaches.

You can also pass the Peace Mission of Father Divine, a cult fig-
ure who was enormously popular up and down the Eastern
Seaboard and on the West Coast for over five years. As you pass,
you can hear Father Divine describing himself as the "Lord God in
bodily form" as the followers cry out, "peace be to Father Divine."
Nearby is the largest African-American church of the time,
Abyssinia Baptist Church, where you can hear the Reverend Adam
Clayton Powell deliver a portion of the "Creation" sermon as
recorded by the poet James Weldon Johnson.

But the most exciting time to be in Harlem is at night, and stu-
dents (or the teacher) may choose when night will fall in Harlem,
after they have had enough of the daytime sights. At night, the city
comes alive with the flashing lights of marquees and the faint glow
of the lampposts. You may choose where to go by reading the bills
posted on billboards outside the bars, which are created from pho-
tographs of actual bills of the time period. Or, you may simply
stroll the streets, peering in windows to decide what interests you
most. At the Nest Club, waiters are setting up for a fancy dinner,
while across the street people are eating at a more casual dough-
nut shop. Passing one club, you can hear Bill "Bojangles"
Robinson tap dancing inside and reminisce about the time that he
tapped five miles down Broadway on his sixtieth birthday followed
by over 500 well-wishers. As the project develops, you will be
able to visit the Hot Cha Club where Billie Holiday got her start, or
the famous Savoy Ballroom where dances like the Charleston and
the Lindy Hop were popularized. Tonight, the Chick Webb

Orchestra and the Jimmy Lundsford Band are playing in the "Battle of the Bands," an all-night concert that goes on until one band quits or the sun comes up, whichever happens first. You can stay and listen or just watch dancers perform the Lindy Hop or the Jitter Bug. Small's Paradise is nearby and is where Langston Hughes frequently visited, while down the street Myra Johnson is singing at the Apollo Theater as part of Amateur Night. What is fascinating about the clubs in Harlem is the diversity of the clientele, from the "all-white" Cotton Club to the interracial men's club called Barron's Cabaret or the predominantly gay and lesbian audience of Edmund's Cellar.

But what most people want to experience is Harlem's famous Cotton Club, where African-Americans are not allowed. The gold and wood-crafted doors of this Mafia-controlled club are unmistakable, and as they open, you have a sense of entering a world of wealth, exoticism, sensuality, and illusion. Designed to be reminiscent of old plantation life, the interior strikes you as a combination of the Old South and an exotic island jungle. There are palm trees everywhere, and the room is filled with laughing guests in evening gowns and tuxedos. If you stay long enough, the curtains will part, and actual footage of a filmed performance of the Duke Ellington Band will play on stage while dancers tap in the foreground as an introduction to singer Freddie Washington.

In our development plans for Virtual Harlem, if you tire of the Cotton Club, you will be able to sneak out through the door that says "colored entrance" on the outside, which functions as an entrance for black waiters and entertainers. In the back alley, you may find that Duke Ellington band members have gone to hear Bessie Smith sing at the After Hours Club, a blues bar behind the Cotton Club. Finally, there are always the salons held in the brownstones inhabited by the intellectual class, where you can mill around with Jessie Fauset, Nella Larsen, Wallace Thurman or Zora Neale Hurston. Or there is the notorious "Dark Tower" made famous by A'Lelia Walker, daughter of Madam C.J. Walker, beauty culturists who made millions developing skin and hair care products for African-Americans. The walls of the "Dark Tower" are covered with poetry by Langston Hughes and Countee Cullen, and the clientele will give you a sense of the weekends filled with poetry and music that occurred in this place.

Virtual Harlem as a Learning Environment

Virtual Reality is a computer-generated setting that envelops endusers in virtual environments to various degrees. The user can don a head-mounted display and be totally immersed into the environment, or wear stereographic glasses, which offer an enhanced level of graphic detail but only semi-immerses them into an environment. The third level is one pioneered by the University of Illinois-Chicago, called the CAVE, an acronym that stands for CAVE Automatic Virtual Environment. The CAVE is a theater 10x10x9 feet, made up of three rear-projected screens for walls and a reflec-

tive projection for the floor. Designed for a multi-user experience, each wall of the CAVE represents the field of view for the users. Because the CAVE is designed for multi-user experiences, it allows groups of students to experience together, yet separately, any virtual environment because each user may look in any direction. Moreover, CAVEs can be networked, providing a collaborative experience shared in widely separated CAVE units.

The CAVE acronym alludes to "Allegory of the Cave" found in Plato's *Republic*. In his account, Plato explores the ideas of perception, reality, and illusion. This same sort of exploration can now be more effectively incorporated into various courses using Virtual Reality.

Because of the interactive potential of virtual reality learning environments, students can not only be immersed within an environment that will actively engages them on both a technical and pedagogical level, but they can also collaborate with students anywhere around the world who are studying the same material and have access to the same hardware and software.

Though multi-campus collaborative endeavors are becoming more common on the World Wide Web in a textual format, they have not been fully explored in interactive formats in advanced VR environments. By evaluating and documenting the way students interact with course material, with one another both locally and at a distance, how participating faculty members revise their teaching methods, and how effectively students retain material, we hope to encourage more post-secondary institutions to incorporate this technology on their campuses.

A majority of colleges and universities around the nation offer courses pertaining to African-American culture. These are usually taught as surveys, representing a very broad time-span. Though students who take courses in a number of departments may be exposed to a correlative number of political movements, artists, historical events and personalities in courses scattered over many departments. More often, students take only the courses in their own departments and thus miss significant aspects of African-American culture because of the length of the period that must be covered within a semester. To compound this problem, students are usually enrolled in large lectures and required to complete an exhausting amount of reading during the course of a single semester.

Therefore, current instructional practices reinforce the "passive learner" mentality often learned in their secondary school experience. The frustration that students sometimes experience because of the way large survey classes are scheduled is increased when they are asked to research on the Web and find the task daunting even if they have easy access to the Internet. For example, there are hundreds of search engines with links to sites pertaining to African-American Culture and a dazzling number of Web-based resources that may or may not be "valid" from a research viewpoint. Their experience of the Harlem Renaissance becomes disjointed and fragmented.

The goals of the Virtual Harlem project include the development of materials that incorporate advanced visualization and interactivity techniques to facilitate greater comprehension by integrating and contextualizing a period or a text. Instead of experiencing the Harlem Renaissance as a tangle of information, it is experienced as a kind of field trip to a cultural past where various figures and artifacts fit into a setting as familiarly coherent as the settings of their daily lives.

By incorporating virtual reality technology into their courses, members of the project recreate the historical setting of the texts they are teaching. Hence, the humanities content can be supplemented with realistic images, music, speeches, et cetera; for instance, one of the texts typically used in Harlem Renaissance courses is *Home to Harlem* by Claude McKay (1928). In this work, McKay graphically describes various scenes in New York that he probably experienced while living there, although he wrote the novel while living in Europe. Students begin by reading portions of the novel and participating class discussions on important themes. Students are encouraged to use their imaginations to piece together the portions of Harlem and/or other settings that the author has described textually. The class is then taken to a virtual reality lab where, through immersion, they will be able to expand their imaginary capabilities because they will then have memory and personal experience to add to the artist's description of a particular scene within a novel. We believe that students will gain a more comprehensive understanding of the text, the time-period, and the author's language by "seeing" the scenes in conjunction with their reading.

This project also addresses several important learning objectives identified above: active learning (versus passive learning), interactivity with the subject matter, assisting visual learners who may find lecture formats difficult, and contextualizing the information resources on the Web specific to African-American culture.

According to Kinzer and Leu (1997), learners often enter a class with little shared knowledge between them, their teachers, or others. This often makes it difficult for learners to link new information with what they already know. Kinzer and Leu also point out that students often do not use newly acquired knowledge in appropriate situations even if they have demonstrated a certain mastery over the subject matter in tests. Students may learn something in one class which may have relevance in another, but they have a difficult time making the connection. Sharp, Bransford, Goldman, Risko, Kinzer, and Vye (1995) found that multimedia environments with dynamic visual support facilitate learning and comprehension and increase the ability for students to make connections among various course contents. Both of these studies serve as examples of ways in which some instructional technologies increase comprehension and interest. These studies are also supported by the research of Alexander, Kulikowich, and Jetton (1994) as well as that of Tyler and Voss (1982). The more knowledge brought into the classroom, the greater the frequency and the higher the quality of

self-generated questions (Scardamalia and Bereiter 1991). Knowledge repertoires profoundly influence the interpretation of ambiguous passages in texts (Bransford and Johnson 1973). Thus, a well designed visual environment contains several characteristics that may be useful in helping students overcome a lack of prior knowledge with which to frame newly encountered, complex, and contextually-dense material.

A hypermedia visual environment responds immediately to learners' informational needs as they attempt to construct a model of the information they encounter (Kinzer & Leu 1997). In a hypermedia visual environment, a learner has access to multiple media sources of information. In addition to text and traditional graphic material, learners have access to animation, speech, video, music, as well as the possibility of interacting with real or historic figures. Access to a variety of information structured in a coherent framework can be used to explore various cause and effect relationships or complex relationships between multiple disciplines. Expanding on the notion of the environmental effect on learning, William Winn (1993) proposed that a different type of learning, "constructivism," can occur in a virtual environment when students actively engage in the creation of knowledge. R. M. Gagne, et al., anticipated by the group of researchers led by Jean Piaget in the 1930s and 1940s, proposed a "constructivist" theory of learning in the early 1980s. Rather than passively receiving information, according to his theory students should make decisions based upon various options presented to them (e.g. whether to drive or walk, whether to go inside a cabaret or look through the window, whether to read poems on the wall of a popular establishment or listen to jazz). This active decision-making gives students the feeling of not only participating in a real world environment, but also turns learning into exploration. Because of the sense of agency that the student feels, he or she is more likely to engage in learning. A part of constructivist theory advocates teachers acting as facilitators functioning to help students become active participants in their own learning, thus making meaningful connections between prior knowledge and new knowledge, and between disciplines.

When students read a text, they are experiencing, second hand, the author's views. Although this second-hand account of an author's knowledge of a place or event may lead to a good understanding of what the author may have been trying to express, VR affords the student an opportunity to experience "first hand" the same environment, event, or setting that the author is describing through an accurate recreation of the environment, not just the recreation of a single scene from a single work of literature. Students may discover additional or entirely new meanings because they will have "seen," "explored," and "experienced" the environment themselves. In this way, visualization becomes a kind of "intertextual" engagement, in which students interact with a simulated environment, augmented with music, photos, and dialogue. Visualization promises not only to open the text to new possibilities, but also to revolutionize the notion of what it means to "read"

or experience a text. This aspect of virtual reality should be vital to the future of literary, historical, and social criticism.

One of the primary reasons for incorporating virtual reality in humanities curricula is to engage students on both a visual and critical level, so that an historical movement, say the Harlem Renaissance, within African-American culture can be better understood and evaluated by having students enter into a realistic simulation of the environment that inspired the artists, educators, musicians, authors, politicians and economists they are studying. The cross-disciplinary aspect of this virtual reality project in the humanities encourages students to explore relationships within a particular period even though independently-taught courses in its music, art, literature, psychology, and history are their primary sources of information.

A Thumbnail History of the Virtual Harlem Project

The Virtual Harlem project began as a one-teacher project supported by the ATC at UM as I mentioned in my introductory remarks. As my interest in this advanced form of visualization increased and I became more knowledgeable about the technology behind the creation of computer-generated environments, I began to focus my attention on how the Virtual Harlem project might be expanded to include more universities and organizations where learners are studying the Harlem Renaissance. At this point I met Jim Sosnoski, who was at that time the Director of Graduate Studies in the English Department at the University of Illinois-Chicago (UIC). In the late summer of 1998, he visited Virtual Harlem at UM. Jim was so impressed by the possibilities of the project that he agreed to introduce it to the VR specialists at UIC's Electronic Visualization Lab (EVL). Shortly after Jim's visit to MU, Dr. William Plummer—the inspiration behind the creation of the ATC—and I traveled to Chicago to meet with Jim, Steve Jones, Andy Johnson, and Jason Leigh at UIC's EVL. After some discussion, we agreed to collaborate on Virtual Harlem and to install the Virtual Harlem dataset in the CAVE environment at EVL.

As a result of this meeting, a very strong collaborative link was forged between UM's ATC and UIC's EVL, resulting in several conference presentations and journal articles. One of the most exciting presentations was a link between a CAVE in Yokohama, Japan, the ATC in Missouri, and the CAVE in Chicago, which took place the summer after Jim's visit to UM. Students in Jim Hall's class at UIC were "tour guides" for visitors to the CAVE in Yokohama, who asked questions about the Harlem Renaissance. A similarly stirring event occurred that fall. In late October, the MOBE group of African-American business persons (Marketing Opportunities for Black Entrepreneurs), whose convention was in Chicago, held their conference's opening reception at UIC in order to view Virtual Harlem (See Brenda's essay in this volume). In the following semester, Jim Hall from UIC's African-American Studies department and I joined our courses in the Harlem Renaissance in a dis-

tance education experiment. Last year, Jennifer Brody—also from UIC's African-American Studies department, who was teaching a course on the Harlem Renaissance, and I joined our efforts even more closely though again at a distance. In the winter of the year, Ken McAllister (English) and Marvin Landis (Visualization Lab) at the University of Arizona joined the Virtual Harlem project team.

During 2000-2001, several institutions have asked to be linked to the Virtual Harlem network—the Sorbonne in Paris, Växjö University in Sweden, Morgan State University, Vassar. In addition, we have a strong connection with the SARA super computer center in the Netherlands. As I write, CMSU, UIC, and UA are jointly applying for an NEH Exemplary Educational Project grant and Jim and I are co-editing the volume you are now reading.

Somewhere along the way, I realized that avatars, or computer-generated representations of humans, were the link for which I was searching to connect my interest in Jessie Fauset, the notion of Passing, and my new-found love of advanced visualization.

Coming Back to Jessie Fauset

Coming to know that any person entering a CAVE can "pass" for any other person regardless of race or sex made me realize that the connection between "passing" and computer-generated environments was not wholly accidental. Norman Badler, professor of computer and information science at the University of Pennsylvania, suggests that our generation "may be the last [one] that sees and readily knows the difference between real and virtual things" (Badler 2001). Further, Badler suggests, "visual portrayals of human figures will achieve uncanny accuracy in skin, muscle, bone, hair, and exterior physiology. Humanlike models will allow the seamless transition between virtual and real images" (Badler 2001).

Based on these informed premonitions, it is not difficult to imagine virtual worlds populated by computer-generated figures, or avatars, that are controlled by "real life" users who may or may not actually resemble the avatar they control. Additionally, with recent advances in computer processing power, it is not difficult to imagine these same figures controlled by some sort of artificial intelligence. Whoever is in control might decide what their avatar looks like based on the community in which they wish to be accepted, or because they feel a differing comfort level with the "look" of their online persona. All of this can easily be related to the notion of "passing." Granting that many factors related to "passing" are not necessarily related to avatars and cyborgs (racism, violence, and miscegenation), some interesting parallels can be made. Considering the many possibilities associated with online personae and how we soon may "be able to insert (or delete) ourselves from practically any interactive content… [viewing] ourselves and others in customized guises – as we are, as we were, as we wish to be and likewise with other people," it is not impossible to imagine how "passing" still exists in 21st century computer-generated envi-

ronments (Badler 2001). The connections are endless regarding how one can re-configure him or herself in a computer-generated environment (see Jim's essay in this volume) and the reasoning behind why people decide to "pass" in real life. During the Harlem Renaissance, blacks "re-configured" themselves by passing as whites. Now, whites can "re-configure" themselves by virtually passing as blacks.

Imagine one day being able to merge ourselves, in various ways, with advanced computing systems. These systems might include nanotechnology, neural networks, or advanced bionics. The merge will be seamless as there are already people with artificial organs, prosthetic limbs, and artificial eyes. When more is learned about human physiology and how it can be more effectively merged with advanced computing systems, we will see a rise in the development of the cyborg, or an individual who is part human and part machine. When this occurs, there is the possibility that humans will be able to configure themselves based on situational contexts, available opportunities, or for fun. This move will be made possible through what John von Neumann, mathematician and computer scientist, refers to as "Singularity," or "the point when human progress, particularly technological progress, accelerates so dramatically that predicting what will happen next is futile" (McCullagh 2001). The definition of the term deepens to include "whether mankind will approach 'Singularity' by way of machine intelligence alone or through augmented mental processes," suggesting that technology will assist us with our eventual move to new levels of understanding of the universe (McCullagh, 1).

These ideas are not irrelevant to the phenomenon of "passing" discussed earlier. As those who "pass" seek to find acceptance within a world that often rejects them for various reasons, the reasoning behind the practice might be justified. If, however, someone is not born with the physical attributes to "pass," what are their options? Might technology, particularly that dealing with advanced computing systems and our increasing knowledge of human anatomy and physiology, be used to supplement that with which we were not born? Might someone, regardless of their racial or physical characteristics, be tempted to "pass," in whatever way they might, in order to make a better life for himself or herself? The connection between technology-assisted notions of "passing" and those which are purely biological appears clear.

These remarks are speculative. By including them I do not mean to suggest that our development plans are based on such speculations. We have mapped out very concrete and realistic directions for the project.

Where Next?

At present, the Virtual Harlem project is taking two very promising developmental approaches. The first is one explored by the Advanced Technology Center and incorporates more of a commercial aspect. By utilizing runtime engines or game engine technol-

ogy, the ATC believes that Virtual Harlem can be distributed to a wider audience. This approach is currently using the Quake game engine to evaluate the development and usability of this technology for educational purposes. Game engine technology is generally cross platform and can even be configured to work on gaming consoles such as the PlayStation or Nintendo. Many game engines allow for the incorporation of programmable avatars, QuickTime movies, text, hyperlinks to the World Wide Web, and real-time audio.

There are several assumptions behind the incorporation of game engine technology into the Virtual Harlem project. One is that some learners will come to the classroom already familiar with game play and navigation and therefore be less intimidated by the interface. By lowering the level of initial intimidation of navigation alone, we anticipate that learners will concentrate more on content retrieval and interaction than lumbering through an environment with little or no control. Secondly, we anticipate learners to access the environment from multiple operating systems. Game engines allow for development on Mac, PC, and Linux platforms in addition to the possibility of the game consoles mentioned above.

A parallel developmental approach is the one taken by programmers and graphic artists at EVL at the University of Illinois-Chicago and at the Visualization Lab at the University of Arizona. CAVE development takes advantage of multi-user, immersive experiences to enhance the overall effectiveness of lifelike buildings, cars and people to simulate "real life." Originally developed to operate on very expensive Silicon Graphic computers, the CAVE experience is being gradually converted to the desktop. This "port" is being developed not only to increase the audience to Virtual Harlem but also to take advantage of cost-savings and the power of new graphic cards now available for desktop computers.

Eventually I see these parallel developments converging, utilizing either a proprietary game engine or one developed in-house. At this point in time one can experience the Harlem Renaissance only in one of the two ways described, both of which take the old-fashioned way—imagination inspired by the text—a bit further. We are all, in one manner or another, in some phase of passing.

Works Cited

Alexancer, P.A., Kulikowich, J.M., & Jetton, T.L., (1994). The role of subject-matter knowledge and interest in the processing of linear and non-linear texts. *Review of Educational Research*, *64*, 210-252.

Badler, Norman. "Virtual Beings." *Communications of the ACM* 44.3 (2001): 33-35.

Bransford, J.D., & Johnson, M.K. (1973). Consideration of some problems of comprehension. In W. Chase (Ed.), *Visual information processing* (pp. 383-438). New York: Academic Press.

Hillinger, M.L., & Leu, D.J. (1994) Guiding instruction in hyper-

media.　Proceedings of the Human Facotrs and Ergonimcs Society's 38th Annual Meeting (pp. 266-270). Santa Monica, CA: Human Factors and Ergonics Society.

Kinzer, C. & Leu D.J., Jr., (1997). Focus on research - the challenge of change: Exploring literary and learning in electronic environments. *Language Arts*, *74*(2): 126-136.

McCullagh, D. *Anonymity at any Cost*. 1997 Web site. The Netly News.　Available: http://cgi.pathfinder.com/netly/opinion/-)1042,1594,00,html November 24, 1997.

McCullagh, D. "Making HAL Your Pal." 2001 Web Site. Wired News. Available: http://www.wired.com/news/print/0,1294-,43080,00.html April 19, 2001.

Scardamalia, M., & Bereiter, C. (1991). Higher levels of agency for children in knowledge building: A challenge for the design of new knowledge media. *The Journal of the Learning Sciences*, 1, 37-68.

Sharp, D.L., Bransford, J.D., Goldman, S.R., Risko, V.J., Kinzer, K., & Vye, N.J. (1995). Dynamic visual support for story comprehension and mental modeling by young, at-risk children. *Educational Technology Research and Development*, *43*(4), 25-42.

Tyler, S., & Voss, J.F. (1982). Attitude and knowledge effects in prose processing.　*Journal of Verbal Learning and Verbal Behavior*, *4*, 331-351.

Winn, W. (1993) A conceptual basis for educational application of virtual reality.　Human Interface Technology Laboratory, University of Washington.