

As The Virtual World Turns: The Nanoseconds Of Our Lives

SUBJECT: Assignment #7: Research Paper

As The Virtual World Turns: The Nanoseconds Of Our Lives

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Textbooks: • Beyond Calculation: The Next Fifty Years of Computing

Denning & Metcalfe (1997)

• Learning Networks: A Field Guide to

Teaching and Learning Online

Harisim, Hiltz, Teles & Turoff (HHiTT) (1995)

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Abstract

This research paper addresses the issues of Virtual Reality Modeling Language (VRML), and some of its implications in the arenas of children's education and literature. An attempt has been made to give examples of companies who are leading the field in making gigantic changes in the learning environment of our children. This is, of course, an "off-shoot" of the new emerging technologies in general, and is related to all things educational and economic, on a global basis. The research for this writing was a garden of visual delight for this writer. One very important observation is that, within our current delivery systems, the outstanding problematic area in implementing VRML — in education or in everyday life and business — has to do with the recognized and much talked-about "bandwidth" problem, and the overwhelming lack of necessary memory found on today's average computer-user's system. This was no different for this writer! Patience, while the industry "grows up," will be necessary.

As The Virtual World Turns: The Nanoseconds Of Our Lives

VRML in Children's Education and Literature

Giving New Meaning to the Phrase, "Get Real"

In the past few weeks, inhabitants of planet Earth have seen somewhat of a miracle in the making. It is, indeed, a far cry from the 1960s, when our vision of the planets included the desperate image of one Mr. Robinson Crusoe, earth astronaut, gasping what seemed to be dying breaths of thin Martian air while he watched an unattainable mother ship circling the alien planet. His companion offered aid and instruction in the form of breathing oxygen put out by Martian rocks. His companion was a chimpanzee. Robinson Crusoe on Mars had some fairly decent cinematic effects and a small smattering of educational introspection, if not outright value, for those early space-race years.

The current kid on the block, however, has made the heads of the technical, professional, and even the educational world reels, in recent weeks. The Mars Pathfinder mission of last summer and the incredible uses of Internet technology, especially that of VRML (Virtual Reality Modeling Language) have brought factual "music of the spheres" — and a megamillion other small bits of educational data — to the masses. We have watched and wondered, and demanded MORE. This time around, the hero is not a chimp, but an amazing little robotic traveler. The medium is not cinema or even dead re-runs on television, but fantastic virtual worlds available via a computer and a modem. This amazing technology has proven, once and for all, that education IS available to a massive audience, with reasonable cost and dramatic effects. It leaves the "students" excited over the experience and ready to experience more. What more, this author asks, could one ask out of an educational setting? It seems surrealistically "un-real" that this huge classroom of students would actually beg for more. The messenger, therefore, is more exciting than a chimp!

As we ponder the possibilities of technology providing a high level of educational choices, those of us intricately tied to the field of education begin to experience elation. In this author's research, the main objective was to study the use of Internet technology and VRML in the fields of education and literature for

children. Although in its infant stages, VRML presentations show great promise for coming to the aid of faltering education choices and deliverability. We are, indeed, sitting on the rim of a great mountain, as we overlook the vast expanse of the totality of all information known to humankind. This is the claim of many — that all known knowledge will be located in the unknowable reaches of the Internet ether by some short while after the year 2000. It would seem that much of that knowledge will be available in the presentational form of virtual reality. This writing, hopefully, will introduce the reader to some of the main characters, the creators, and the users of this fantastic technology. It will center on those who daily confront the immediate reality of teaching our children well.

Welcome to our WRL!

The Best Way To Illustrate A Point Is To Illustrate It

Over a four-year time span, this author has studied and observed the major publishing houses online. It is to be noted that the publishing and literary worlds have been among the first to accept the challenge and possibilities of the Web. Many of these sites, however, are calling sections of their sites, *Virtual Reality* — but it is not actually that genre. Barely any of the publishers researched had any presentations in VRML. Many, however, had interesting, educational and fun sites for children. It is, indeed, an electronic kids' place online, but it yet is not Virtual Reality or VRML. For now, to research the possibilities for the future of VRML in children's literature and education, we must look to sites mostly outside of those arenas.

Literally, hundreds and into a few thousand, appropriate sites that could easily lend themselves to VRML were found that pertained to children's education and literature. One of the most astounding features of the growth of the Internet over just this past year, is the overwhelming abundance of information on any given subject. It makes for delightful, educational reading; it makes it almost impossible to narrow any given search down to a manageable proportion. Out of these many sites, this author found three main sites that have visible or unique places within the industry: Silicon Graphics, Inc. (SGI) of California, Construct Internet Design of California, and ExploreNet™, of the Computer Science Department & Institute for Simulation and Training University of Central Florida. Later in this writing, each of these companies' offerings will be overviewed.

Is This A Game We Are Playing?

First, it is essential to take a close look at the world of VRML, and its reputation among the masses. This is easily described with one word: GAMES. In spite of the various advances in enabling technology, a spokesman from IBM believes that widespread acceptance of VRML is still in the making. "My feeling is that many of the applications I see are toy applications. Take a look at the conference's award winners.' Indeed, the virtual dungeons and solar systems were impressive but not necessarily useful.

That's not to say useful applications aren't on the drawing board. IBM, for one, is working on a digital library — a global multimedia database — and is looking into applications for e-commerce over the Internet. (Lange, 1997). People still see this technology as pure entertainment. It can only be hoped that the lessons of Pathfinder will launch a whole new mind-set in this arena. IBM's digital library, with their stance in the professional world, will also go a long way in convincing the general population of the immediacy and usefulness of information delivered in a virtual reality environment.

This isn't even to say that there is anything wrong with games. An interactive and fun setting is, many times, the only way that certain children can be reached. There are many studies that show that learning, as well as functional and spatial skills are enhanced within a game environment. So . . . speaking of games . . .

A Historically Sound Idea

When "virtual reality" entered the public eye in the mid-1980s, one of the first potential applications discussed was education. The concept of furnishing students with a doorway to experiences that were far apart in time, space or scale, or which depended on laboratory resources that just were not available, was immensely attractive. However, over ten years later, three-dimensional immersive (as in dunk, plunge, immerge — all commonly experienced by those of us in this technology!) virtual environments (VE) remain very expensive and strenuous to manage. Part of this writer's experience with VRML has been a realization of certain limitations to the technology, based upon the expense and management of the WRLs.

The authors and initiators of ExploreNet™, in Florida, have some excellent opinions on this subject. They state,

"Upon reflection, many of the anticipated advantages of VE could perhaps be achieved with simpler technology. The simulation, interaction and communication aspects of VE in particular seemed amenable to relatively low-tech, widely available solutions. In 1990, the [ExploreNet™] authors encountered the Habitat system built by *Farmer and Morningstar* for *LucasFilm* (California film and multimedia company). Simple cartoon-like animated figures moved through a flat-screen simulated world. They communicated by typed text messages [that] appeared over the characters' heads. A client program ran on one's own Commodore 64 computer, which accessed a commercial on-line information service via modem.

"The server application supported a database consisting of a complex series of interconnected 'rooms' or scenes. Objects could be picked up, moved around and exchanged between players. The authors immediately realized that this environment offered great opportunities for education, and embarked upon building an educational version. Like many technology projects, our sense of objectives and teaching methodology co-evolved with successive versions since 1991." (Hughes & Moshell, 1997).

It is with this very theory in mind that this author would like to remind the reader that "there is more that meets the eye" than what is seen in the wide WRL! There are many MORE environments online that utilize (then) state-of-the-art techniques, which can be thought of as virtual reality, but are not necessarily VRML. We must keep these sites and producers in mind when we research virtual reality. They are the very ones that embraced the new technologies, and they most likely will be the ones, such as the Florida educators, to walk bravely into the new WRL of VRML, with all its exciting educational components.

ExploreNet™ has many attributes that are soundly "VRML-ish," but their worlds also ring bells for those of us who have been in this technology for a while. Much of the description is similar to hundreds of MUDs, MOOs and MUSEs that many of us have had the delight of getting to know. This experience with text-based virtual reality has already reached classrooms around the world, also. Some

of these MUSEs and MUDs on the Internet — such as those of the MIT Media Lab — have brought a form of virtual laboratories into K-to-12 classrooms for years, and have offered educational simulations and role playing environments to ALL Internet users. These are constructed worlds. They take gaming and role playing to a more sophisticated level — which are the implications that major companies such as IBM are starting to see. The indications for educational virtual reality and televirtual (virtual worlds that are networked) learning networks are just now beginning to be explored. With time, research and evaluation, their worth and capacity will be better absorbed. (Harasim et al., 268).

Prime-Time Education in a Budget-Cut-Crazy World

Everyone these days is rightly concerned about the issues of budget cuts and downsizing. Perhaps in the field of education, we have seen whole districts and cities the most hard-hit. Parents and educators alike are very worried. The scope of education for our children has drastically changed, in an almost ironic way. Entering this highly technical age, it seems shockingly twisted that many major budget cuts within education have to do with technology. It would seem that we are hell-bent on equipping our children with . . . *nothing* . . . when it comes to grappling with the advent of "electronic everything." It almost seems lucky, then, that children seem equally hell-bent on embracing this new world, and take heartily to the technologies that strike fear in the hearts of their parents! What technology do they embrace? Again, in one word: GAMES. Let us never underestimate the values and skills inherent in the learning of a game! Harry Vitelli, Vice President of marketing at one business immersed in the advent of VRML, Newfire Inc., said this: "VRML is going to help bring more games to the Internet, but not just games for their own sake, but also to draw users to Web pages featuring online commerce, events, travel and learning/training. Developers need to make content that's fun." Vitelli, formerly of Apple's QuickTime group, continued, "And VRML allows them to create videogame experiences in a Web browser that take weeks, not years, to create." (Gorman, 1997).

This, then, brings us full-circle back to the question of money, budget cuts, and learning. If videogame experiences will take weeks and not years to create, the same can be said for interactive, virtual learning worlds. If children can be educated with the less costly uses of this technology,

sometimes in more effective ways than in the traditional classrooms, it seems logical to suppose that this media will soon earn much-deserved acclaim by budget-conscious parents. These are the ones who also want the best education for their children!

How Quick Is Quick?

This writer's research clearly revealed that the major holdback of the general populace concerning VRML and education wasn't a worry that it was all so much "fun and games," as the fact that most end-users are limited by bandwidth and an extraordinary download time. If, on the typical home computer system, it takes 20 minutes for a virtual world on, for instance, geography, to load — there isn't a child in the world with an attention span long enough to dredge up the enthusiasm to stick with her studies!

Jim Nölsche, project manager of *Real Education, Inc.* of Denver; had some very interesting viewpoints concerning this issue. The company specializes in the creation and management of online educational sites. One of their best-known "worlds" is the online campus at the University of Colorado in Boulder. This very efficient online university is growing by leaps and bounds, as is distance education on a worldwide basis.

Nölsche stated to this writer that the use of VRML, or the desire to incorporate it into existing sites, is very frustrating. Clients want it, but the company finds that VRML is not yet speedy enough. Balancing client desires with REAL reality, *Real Education's* use of interactivity remains with technology that is currently quicker and has proven standards. He quickly added that the technology is advancing at such a rapid rate that these factors could change almost overnight. Their company currently uses the highest state-of-the-art techniques in audio and video streaming principals. These methods create a highly effective university site. However, even within this realm, many home-users still don't have the computer capacity to utilize even *Real Education's* sites. So, at that point, the question is entirely moot. The bottom-line analysis would reveal that it isn't just VRML that will have to improve as it ages . . . there are many current Internet methods that will continue to undergo similar improvements. Meanwhile, it is interesting to note, as Nölsche pointed out, that education sites and administrators are coming online in unprecedented numbers. (Nölsche, personal interview, 1997).

This writer, previously a die-hard "right-brain" artist, and now a ten-year computer veteran in most graphics and multimedia areas, has often been known to stand in front of the microwave oven, vehemently urging it to "hurry up!" It is a good thing that carting firewood to the wrought iron stove to start a four-hour cooking job was not on this person's agenda! Similarly, many computer people have been known to prompt (loudly!) their computers to speed up operations. We have become accustomed to something that is not really instant gratification, but to what might be called the "cyborg" expectations that we've acquired as an addendum to our technical world. Our machines literally have become a part of us. This makes us an interesting combination of human beast and impartial, SPEEDY machine. In order to just keep pace, we have had to adopt this principle — almost-obsession — of speed.

In the recent convention concerning Virtual Reality in San Jose, California, a demonstration was given whereby Web pages written in HTML ran in one frame, while VRML ran in another. Truly — how quick is quick? This demo made the often-misunderstood point about how featherweight VRML is, once compressed — compared to other technical means. In the example shown, it was claimed that Macromedia's Shockwave, one of the current standards for interactivity on the Web, would take ten times the bandwidth to create the same effect. (Gorman, 1997). This has, or should have, an explosive effect on those of us immersed in Internet technology and in education. For the world of children's literature online, it has even bigger impact, as the traditional high memory requirements of the artwork found in children's illustration is a big concern when it comes to producing electronic children's books.

How Real Is Real — And Can It TEACH?

When it comes to children and education, there are a million people out there with about a million ideas and concerns. As we ALL enter (some of us reluctantly, or even downright stubbornly) this age of new media and methods, some of these concerns really need to be examined. There is one group that claims, for instance, that the electronic revolution, dominated by faxes and [Emails], has helped turn the problem of shyness into an epidemic. The world's first conference on the subject was held recently. Professor Philip Zimbardo (the keynote speaker) said life was becoming more difficult for those who had trouble communicating. He stated, "The electronic revolution of Email and faxes means the medium has finally

become the message . . . with more virtual reality overtaking real reality, ordinary skills and situations are becoming more awkward." (Cooper, 1997).

In this author's opinion, this definitely needs more review. On a personal and professional basis, this writer has worked with "at-risk" and disabled children, and there is a truly astounding process that happens with many of these often withdrawn, mostly unhappy and surly young folks. The computer environment frees them of the shackles of opinion — the disabling opinion of the world at large. Many students have been seen to blossom almost immediately when near-instant successes are achieved on a computer. The child's capacity for education grows at a rapid rate when the constraints of the public are taken off their backs. The at-risk child begins to see that not only is he/she "normal," but perhaps very good at this! The disabled child, left to explore worlds that give him/her abilities that have been severely limited by physical reasons, takes on a whole new inner vision of herself.

This, then, takes the study of VRML and education into the realm of the spirit and emotion. Very rightly, as educators, we must pay attention to the emotional impact of subject matter on children. We don't have to even work very hard to convince others of that. How can the producers and users of VRML move this in the right direction? One online article, "Virtual Reality Adds Emotion To The Web," addressed this issue:

"Moving the Web beyond its static content to a place where a Website can be a full-blown emotional experience is critical to selling the Internet to the unconverted public. To that end . . . co-creators of the VRML outlined some real-world uses for the technology this week [the San Jose convention on VRML] to help more fully humanize the Web." (Haney, 1997).

This sounds fairly broad-based, until we dive in and see what's really going on.

Parisi, member of the board of directors of the VRML Consortium, and Vice President of Intervista Software Inc., believes that 3D is the "user interface that promises to transform the way we use computers." He recently stated that VRML's advantages and benefits far surpass just the making of interesting games to what he refers to as "the three I's." These are: Interface (more intuitive), Information (more interesting way to present), and Integration (into a more immersive environment) (Gorman, 1997). It appears to this writer that the main objectives of the very creators, the current

"standard-setters" of the industry, are primarily to create solutions for those concerned with the educational, informational aspects of this fascinating medium. CAN VRML teach? The creators seem to think so.

How Human Is Human — And Can It ("He," "She") TEACH?

Matsushita Electric of Tokyo recently announced that they were immersed in the development of 3D computer-graphics software for creating animated virtual humans to use over the Internet. What possible connection, the reader may ask, could this have to education or literature for children?

"With current Internet technology, users of virtual chat rooms, network game players and the like must make do with crudely shaped *avatars*, the roughly rendered cartoon characters used to represent each user that appear on the screen in real time. But with Matsushita's new technology based on VRML, more realistic human characters can now be made to display complex natural motions on the Internet, said Shige Asahara, spokesman for Matsushita's Multimedia Development Center in Osaka, Japan.

"These characters can also be interactively controlled over the Internet at a modem speed as low as 28.8 kilobits per second when using a standard Pentium-based PC, Windows 95, an OpenGL graphics accelerator board and a browser that is VRML 2.0-enabled, such as Netscape Navigator 3.0 or Silicon Graphics Cosmo Player." (Boyd, 1997).

As indicated previously, then, what is good for the GAME, is also good for EDUCATION. New technologies are now emerging that will give the end-user — in this case a child being educated — a very natural and human interface to the program she is using. What is also important about this resource is, again, the cost factor involved in this potential form of education.

"'The problem with the Web is that it's dull, dull, dull,' said Mark Pesce, co-creator of VRML, speaking at the Object Expo conference held in San Jose. 'The Web is supposed to represent the whole breadth of human experience, but how can you do that using only text and images?' He said the key stimuli humans respond to are sound, motion and emotion. 'At some level, we respond to human body language . . . establishing some emotional resonance makes communication across the Web more effective.' Pesce said

VRML will have the capability to handle streaming media such as audio and video by the summer." (Haney, 1997). While many of us, including this writer, would not agree that the Web is dull, we all would agree that a part of communication deals with emotion. It is interesting to note that the very creators of VRML, in establishing virtual reality standards, recognize the need to maintain the essential components of *REAL* reality situations. Emotion is a flesh-and-blood thing — or, so we thought! In the effective use of virtual reality — whether for games or for education and literary purposes — for it to work, an innate humanness must be retained.

. . . And Can It Illustrate? — Examining The Electric, Virtual Book

In studying and reacting to literature online, we must keep the emotional content in mind. After all, there is nothing in the world as compelling as the sensuousness of a new book, with the print and paper smells and the tactile aspects leaping out at us. Gilt-edged pages and a cloth bookmark don't hurt, either! For those of us who love books, perhaps the idea of electronic illustrative children's literature is incomprehensible . . . what's to feel, or sniff? As the author of several published children's books, and illustrator of hundreds of children's illustrations, this writer is the first to say that the love of a good kids' book begins in the wee years of life. The human component — of course! — utilizes the emotions . . . we probably touched, sniffed and even tasted it (nothing like a good book binding to cut those teeth!) from our mother's lap. How can this love be transposed into the world of the Web?

The research for this paper led, once and for all, to the laying to rest of this particular concern. While we all recognize the differences in researching a topic in the library versus a similar research online, the reading of a book is a more intimate happening. Immediately, the beauty and incomparable interface of this special medium was brought to life by a few exceptional sites. One such site, by *Construct Design*, was entitled "CRUTCH." (<http://www.construct.net>). Loosely, the story was imaged after a Greek myth. Although a bit grisly for children's literature, this story is unparalleled in concept and beauty — including anything the print world could ever provide. It is a full-fledged VRML narrative from Mark Meadows at *Construct*. This writer was so impressed with this poignant, disturbing story, and dozens of hours were spent perusing the pages and then studying the resource and information files. It became compelling to see where

and how the author/creator began his saga. The graphics, animation and interface are well worth the download time. Without a doubt, this story could never have been delivered in any other way. Therefore, it stands as an excellent example for the verifiable usefulness and loveliness that can be achieved by this medium — and *this medium alone!* This site is the very essence of what VRML can do for children's literature, online.

The creator of "CRUTCH" is the first to acknowledge the limitations of the current VRML offerings. He said, "We tried to keep each page below 150K, but to varying levels of success. There are a few exceptions — mostly because of animation. but it's better than MPG at least. Some of the audio files get a wee bit hefty too. There's still a long way to go. It is, still, a prototype." (Meadows, 1997). Indeed it IS a prototype. Typically, improvements come after the initial version is presented to the world. In this case, this WRL gives a poignant promise for the future of children's literature. Many, many sites were visited in the research of this topic. There are extensive listings and sites for children; a minute few are VRML, many others are just very fine children's sites that deeply enrich our children's everyday world. "CRUTCH" was the pinnacle of both beauty and virtual reality to be found within the parameters of this research.

Putting VRML To Work In The Real World Of Children's Education

The Teachers Are The Leaders

Mark Pesce, previously mentioned as co-creator of VRML, showed two visualization demonstrations aimed at the educational market. One was of the Earth as viewed from space in real-time. The other showed the anatomy of the human body. "In the anatomy display, a student could navigate around the body, removing skin and bones to observe the viscera in 3-D, in motion and with sound effects. For example, approaching the chest cavity, a student could both see and hear the heart beating in a real-time simulation." (Haney, 1997). This could be seen as the perfect environment for introducing biology and other studies to students. Without the fear of the "gore," or of making unforgiving mistakes, the VRML "biology lab" could provide ease to students who previously might have avoided the topics.

ExploreNet™ writes on the 20th of May, 1997: "We have started designing the new, Java-based, version of ExploreNet™. This version will include many enhancements, especially in the areas of multimedia objects, world-based authoring, and multiple forms of social interaction." (Hughes & Moshell, 1997).

In researching ExploreNet™, this writer found that it is a "general-purpose object oriented, distributed two dimensional graphic-based computational environment with features to support role-playing games for educational purposes, and cooperative learning of many kinds. The design goals are:

- 1) To make ExploreNet™ simple enough that it can be useful and entertaining for a sixth grader (or even an adult) within a minute of first encountering it;
- 2) To enable ExploreNet™ to operate on inexpensive PCs (25MHz 486's) with Internet addresses; and,
- 3) Ultimately, to construct a platform-independent networked cooperative work environment for the design, construction and educational deployment of ExploreNet™ worlds.

After constructing three prototypes between 1992 and 1994, they have largely achieved the first two goals. The current version of ExploreNet™ is a Windows/PC application written in the Smalltalk language, and they are now building a platform-independent version in pure Java. The convenient authorship of multimedia materials has been revolutionized by the arrival of Java-enabled World Wide Web browsers, and they believe that their strategy for authoring ExploreNet™ materials is based on this fact (Hughes & Moshell, 1997).

One noteworthy observation would be that particularly those who have immersed themselves since the early history of this technology, are now embracing the new methods. They applaud the advent of new programming languages and techniques in the multimedia world. There are MANY institutions and individuals working very hard on bringing cost-effective, informational, education software to our children. Like this author, they see that this is the pathway to the future. Much of education as we have all known it, is quickly flying down that pathway.

The Students Are The Leaders

Who are the *Toy Scouts*? A very impressive website was encountered in this research. This group calls themselves the *Toy Scouts*, and this is how they describe their commitment to Internet things, especially VRML:

"We as *Toy Scouts* are dedicated to advancing technology in the field of Virtual Reality. We are a volunteer group of students with the grand privilege of utilizing the equipment at the Institute for Simulations and Training Visual Systems Laboratory (IST).

"Our Mission: *Toy Scouts* is a not-for-profit organization designed to promote educational opportunities to interested individuals by exploring new technologies for the purpose of developing creative new applications and concepts. Focusing on the human element, the Toy Scout Foundation encourages mentoring and cooperative efforts in an inventive spirit of fun.

"Who We Are: At IST, we take pride in fostering the ability for students to learn and work together in teams. This is typically an area where traditional education has fallen short. To support this goal, a few of IST's Faculty and Staff volunteer their time to mentor some of these bright, creative, and terminally dedicated students known collectively as the *Toy Scouts*.

"The *Toy Scouts* are an informal group of high school, undergraduate and graduate students who have an interest in computer graphics and the development of synthetic environments. Basically, anything from the Internet to the latest advances in visual simulation and synthetic environment development are fair game for the *Toy Scouts*." (Milliner and Milliner, 1997).

Could any of us, as technologists, as educators, as parents, or as just concerned human beings, have expressed any more clearly the objectives of this exciting, new medium? This writer was astounded to find the high acceptance level within the ranks of our youngsters. Could it be that they are closer to the impending changes? How are we going to look into the nature and souls of our young people, who are the very victims of issues such as downsizing and huge budget cuts, in the very arena that most affects their lives, and explain why we've not at least provided a substitute? Whereas we see these things as inconveniences or money matters, our children see them as they truly are — the cutting of the lifeline to the future. THEIR future.

If outstanding children such as the *Toy Scouts* can not only embrace this new medium, but learn to master it and perfect it, then they are proving that even the most vulnerable among us have the capacity to join the ranks of those providing the solutions. If we are to salvage children's educational choices — let alone, children's literature — perhaps we should give more credence to the young voices among us. It isn't just the creators of this powerful new technology who are announcing the benefits to the world. Perhaps, from that angle, the general population would be right in suspecting that advertising and marketing dollars were at stake. When the voices come from the children who will benefit by this educational tool — or "die" (perhaps literally) for the lack of such a tool to shape their lives — it is time to stop and listen.

The Never-Ending Story

Research showed that one study has revealed that parents spend only six to eight minutes a day talking to their children. (Cooper, 1997). What kind of a world is that for our young people? The very technical world that has created the high-impact, high-speed, "push" technology is the same technical world that has shaped our lives and our children's lives. Ironically, and justifiably, in a "bit of the hair of the dog that bit us" manner, this technical world is also the means for deriving solutions.

Hopefully, within this writing, it has been obvious that the benefits of education and literature in conjunction with VRML far outweigh the shortcomings. With the marvelous trend of new-age "cyborg" mechanics, perhaps this will be a huge help in giving us back some of that precious time with our children. Communication is what it is all about, with an eager, eagle-like eye on the emotional content. Thirty years ago, we visited Mars with Crusoe and his chimp, and we were emotionally impacted by the beauty and pathos that only cinema could bring us. In the summer of 1997, we were allowed a visit to Mars, "riding" on the VR turtle's-back of a baby robot-rover. We were emotionally impacted by the beauty, the pathos, and the invincible spirit of humankind on an unprecedented journey. In considering education on a widespread basis . . . it was only available because of VRML. The masses responded.

It really is a never-ending story. The boundaries of our universe simply keep getting bigger. To embrace the "bigness" of this ever-evolving universe, we must give our children the tools of today. We MUST understand and start to grapple with the truth that the character of education is being changed by the

networking system that brought us . . . MARS. Education is changing at all levels. (Harasim et al., 269). New learning environments are shaping our children. It is the *children* that will forge the tools into the instruments of tomorrow. Tucked within the boundaries of the New Media is the virtual reality modeling language, still in its infancy. However, VRML is alive and well in current trends for education and literature for children. This infant must soon grow up.

The very element of time, itself, has appeared to have changed. We are gulping down tremendous amounts of information that used to take months or years to assimilate. Now we aren't even dealing with the 60 seconds of everyone's minute — we grasp as much as we can, in nanoseconds!

Where will we all be in the next few decades? With certainty, we will still reside in towns and villages. But, quickly, our work, pleasure and learning are beginning to take place in a less earthly, dirt-based plane! We are starting to deal with all information and communication needs in that "cyberspace sprawl" that is defined by our intellectual interests, more than geography or demographics. (Denning & Metcalfe, 9). The world is huge. We've discovered that there are many more huge worlds out there — **which WRLs are you visiting today?**

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