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SEIZING A NEW FRONTIER

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Seizing a New Frontier: 3D and Animation in Libraries

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Abstract

The Texas Tech Library recently opened a robust, inter-disciplinary 3D Animation Lab, with a highly innovative blend of emerging tools and resources enabling radically new endeavors in teaching, learning, research, creativity, and collaboration in an open access environment. This article addresses what we did, why, how, and what it means.

Edwin A. Abbott wrote of a two dimensional world in a classic fable titled “Flatland” from the late nineteenth century. It posited a world of only two dimensions, described life in a two-dimensional reality, and extrapolated a three-dimensional experience that tried, like Albert Einstein, to create a new general theory of relativity redefining the frame of reference of our perceptions. The book has enjoyed enormous popularity for well over a century, and an aluminum-covered special edition introduced by Ray Bradbury is only one of the recent editions of this classic. The concept of three dimensions (3D) has been with us forever, but only recently have we developed the capacity to create inexpensively, with regularity and clarity, 3D representations and views--and even 3D animation. Each generation must rediscover the value of a set of tools such as 3D for itself in order to bring its perspective into service. While not really a new frontier, 3D is a frontier unknown to libraries.

Until now.

At a Crossroads

Libraries have always been on the crossroads of access tools and content. We have labored for generations to create the tools and to store and utilize the content for the benefit of patrons. We housed materials and the tools to unlock them. We also taught patrons in the use of the materials and associated tools. In like manner, animation and 3D representations are just another form of content that are interestingly blended with the tools. For teaching, for scientific illustration, for entertainment—3D and animation are here to stay; what has *changed* is the manner in which these types of content are developed and utilized.

Existing and emerging 3D animation technologies permeate our culture, and the dynamic worlds of education, work, and entertainment—of which Libraries continue to play a significant part. Simply put: these technologies convey many kinds of information and content better! People like them and use them. The Internet thrives on them. There exists an entire generation that considers this

kind of technology an intrinsic part of its world. They use it and expect it in their pursuit of information, in their communication and collaboration, and in their preferred approaches toward education, work, and recreation. For them, as well as increasing numbers of the older generations, these technologies are exciting, engaging, entertaining, and productive—more and more a normal and even essential part of everyday life.

The field of astronomy, for example, has always dealt with learning objects that existed in time and, significantly, also in space. The tools of 3D and animation—the perceptions afforded by these tools—make astronomy a much more viable and vital scientific study than heretofore possible.

A 3D computer model of a historic building allows anyone to “walk” through it in a browser, step around all sides of the building, or view the rest of the world from inside the building looking out. Photographs, of course, can convey how something looks. But 3D models add dimensional context, showing it from all sides, then in low light, then in bright light, and so on. With the right computer tools a viewer can experience a building not yet built or one long gone. This viewer can enter a scene built to reconstruct the past when the surrounding landscape looked different. History can be rebuilt, piece by piece. Photographs of historic buildings today, along with known facts and scientific data, can be rendered into 3D animation to reverse the sands of time and bring that building back to how it appeared when it was first constructed. A “digital 3D Stonehenge” has accomplished this in attempts to answer some questions and to help eliminate speculation.

We can work in 3D animated simulations to illustrate or consider how something might be or to explain a concept which is otherwise elusive to watch in nature. By modifying lighting and color, deeper knowledge of natural phenomena can unfold. Animation adds the element of time. We can slow it down, or speed it up, helping us to see more clearly the changes brought about by erosion, for example, that we might find difficult to perceive otherwise.

Video and film editing, and special effects technologies are no longer out of reach of the average person. Emerging 3D animation technologies are available at little or sometimes no cost to anyone who wishes to learn and dabble, or even pursue as a profession. More and more professional and personal endeavors incorporate and utilize these new technologies in countless ways.

Hearing the Voice of Tomorrow

In our fast paced world, both the predictable and the unforeseen have dramatically changed the knowledge and understanding necessary for library success. The voice of tomorrow calls us even if we don't hear it. Technological advances, cultural trends, and ways of confronting vast emerging economies, are

bringing us to challenge many of our assumptions. A constantly shifting landscape is constantly generating new disciplines. Among these new disciplines are the culturally omnipresent technologies of CGI (computer generated imagery), SFX (an acronym for special effects), and the blending of film with animation. 3D modeling and programming are not exceptions in industry and science, but rather, the tools of choice for the development of everything from toothbrushes to missile systems. 3D models and animations of products sit in virtual catalogs allowing potential buyers to spin them around for a complete look, or showing the product in use in its ideal environment—an environment the potential buyer can manipulate to their needs or their liking. All of this is creating a world of new thinking with new vocabulary, and even new language—a new world of information representation, conveyance, use, interaction, etc.

To live and work and provide services in this new world, we must be familiar with the vocabulary, speak the language, understand the tools, and define our role. If we do not converse in that vocabulary and language, if we cannot think in the way that the 3D tools work with models, we are blind to this major human undertaking.

It is not only about manufacturing something. Even cuneiform clay tablets now come under 3D scrutiny to assist scholars of ancient cultures. Research in nanotechnology uses 3D technology to work with components that are too small for unaided eyes to see. Curious machines that first came to life in modeling programs now roam the vast expanses of space exploring the solar system. The technologies of 3D and animation enabled these designs by modeling solutions to questions about how the new gadgets will handle the yet unknown realms.

Clearly, 3D and animation technologies are among those basic tools that place knowledge searchers in a better position to explore the world around them and build upon existing knowledge. Particularly significant, the animation of processes allows the testing of ideas in real world applications without the drama of real-world costs and real-world catastrophes. Animation becomes the savior of every engineer's dreams, a mode of realizing their visions. Animation simulations allow us to test on a large scale in a realistic way the safety of complex systems such as air transportation or massive construction projects, providing a better overall product. Animation can save lives, save time, and save money.

The Vocabulary of 3D

Working with 3D models, viewing them and rearranging them, represents only one piece of the broad 3D animation skill set. The ability to produce models, to create animations, to talk about things that do not yet exist except in the imagination of the inventor, are also important pieces of working with 3D. These skills sets include conceptual understanding of computer modeling, rendering,

and animation, all of which are part and parcel of working with 3D software. In short, the vocabulary needed, includes the “vocabulary of 3D”.

That vocabulary includes abstractions such as how to imagine which 3D concepts are needed to convey or represent an idea. For instance, a recent contest called for physicists to produce a two minute animation for a competition on explaining String Theory, which rests in eleven dimensions and is made of components no one has ever seen. This is where the capacity of the 3D vocabulary can come to the rescue. Thinking in terms of 3D modeling provides an approach to simulations and visualizations. It enables those with specific knowledge to share ideas with others. Because 3D can be animated easily, it is possible to test new theories and new products in the ways they will be used, and to extrapolate uses otherwise unimagined.

3D technology makes the activity in which it is used seem more realistic. In short, it hides itself and tucks itself “behind the scene” as it produces what looks “right” and “normal.” It even “seems not to be around.” In fact so much the opposite is the case. The realism that 3D technology grants makes its product seem more plausible.

Helping us arrive at what is a broad and multi-disciplinary approach is where the Library fits in. As a service provided by the Library, 3D then fits well, and extends the basic skills of its users, allowing them to expand their horizons for the sharing with others.

The 3D and Animation Lab as Intermediary: A Learner’s Environment

The booming world of 3D animation software is beleaguered by incompatibilities, independence, and specialization—confusing and daunting to novices and experts alike. There are no guides in this new world. There are no pathways to connect disciplines. There is no organization to the collective chaos. The 3D Animation Lab at Texas Tech University Libraries endeavors to address that.

We provide a robust environment with a broad range of diverse and relevant resources to enable unprecedented potential for diverse, creative inquiry and collaborative endeavor. We bring together, in one highly interdisciplinary environment, over two dozen diverse 3D software applications, and hundreds of tutorials and other instructional materials such as books and videos covering nearly all aspects of 3D. The 3D Animation Lab website (<http://www.library.ttu.edu/3dlab/>) provides numerous guides written by Library staff to explain key concepts and software tools, and other timely and vital resources to otherwise assist those venturing into this new world—enabling them and empowering them to venture with confidence and support—from any discipline—and for any reason that suits their desires and needs.

Setting up a Lab as described has its own challenges. A staff must be in place that can select, install, maintain and teach the tools in a networked environment. Texas Tech University Libraries is fortunate that it possesses such a skilled staff, composed of library professionals, and a talented group of IT professionals. The presence of this skill set within the Texas Tech University Libraries gave the Lab a strategic advantage in dealing with some unique problems associated with developing its programmatic goals. For example, manufacturers are used to selling a single product on a single PC for the single user. Some of the negotiations became exercises in hair-pulling. In each and every case we had to negotiate with vendors for pricing that allowed bringing models and textures on board affordably. Many of the vendors have worked very well with us once they have understood the possibilities. It has been a somewhat long but fruitful journey.

The staff also bridges the difficulties new users encounter in working in non-traditional PC environments. For many first-time users of the 3D Animation Lab, dual boot computer systems (which can run either (Windows or Macintosh) is also a first time experience. Drawing tablets are also new to many.

The Lab sustains an extensive website that provides current news and information on industry trends in the world of modeling and animation and links to resources available on the Internet. Included is some advice on purchasing personal equipment for working in 3D and a discussion on how a beginning user can get started in this field professionally. This website has links to publications about employment in 3D and animation. The Lab itself is open during the week from 7:00 a.m. to 2:00 a.m., allowing even the most time-constrained and harried user the flexibility to learn and work.

Still in the Planning Stages

After a planning and training period of some twenty months, the 3D Animation Lab opened May 2007. Stirred by campus news coverage and local press attention, early visitors included students, staff and faculty, high school students in more advanced placement programs, researchers, law enforcement officers and members of the local district attorney's office seeking to recreate crime scenes, and numbers of individuals from other colleges and universities who came to profit from our experience setting up the Lab. While there are many campuses that offer and teach various aspects of 3D modeling and even animation, these instances are almost universally closed to all but those in that specific program. By locating a broad-based 3D and animation lab in the Texas Tech University Libraries, which by its very nature is a democratic environment (we will let anybody use our facility), the response by all and sundry has been tremendous. University administration has been profoundly supportive. And the website for the 3D Animation Lab quickly became the second most visited website on campus.

So is the Lab completely finished?

Not a chance.

There are a great many ideas planned for the upcoming months. The 3D Animation Lab website contains mainly staff work done in 3D. In addition, we would like to add the work of our patrons—students, faculty and researchers. We will sponsor local contests. Contests have a learning side that becomes very important when we look at the overall structure of our 3D Animation Lab offerings. Patron 3D art exhibits will eventually cover the walls of our animation area. By having a contest we can instill in our users the excitement of finishing a challenging project. Experienced lab users can encourage new users as they investigate the lab offerings and can help them over the biggest hurdles. The hope is that the Lab users will be an important part of growing this activity and making it more usable.

As staff positions and skills grow, we will focus in our workshops not only on the topics of animation, rendering and modeling—we will go beyond to building a support infrastructure on campus as the working lab environment develops. Our technological challenges, which include the rolling out of new computers and network capabilities, negotiating agreements with vendors, knowing how to keep up-to-date on the key issues, and planning render farm, are also deserving of time in the teaching environment. The expectation is that the students will be able to do the same kind of tasks as they move into careers, regardless of what those careers may be. Knowing what it took to bring about such an effort will allow them to become more than animators and modelers. They will learn about a vision that augments the past ways of thinking and provides continuity in moving forward, so that users will be able to meet yet unimagined challenges likely to take place in this fast-paced computing environment.

The subsequent chapters about learning 3d and animation are still being written. What avenues of thought and creativity will come forward to fruition from those who now have these techniques added to their skills? Some will move into more traditional areas of art, movie making, dazzling graphics, but others will take these ideas into professions where the technology is still relatively unknown. They will be able to create presentations and teaching modules for their disciplines which will be unlike anything yet seen. They will be able to address levels of abstraction that sometimes make disciplines inaccessible by presenting in animation issues which have never seen a viewer's screen. The entire world of intellectual pursuit will grow by leaps and bounds.

Unknotting Theory

For the sake of argument let's call difficult problems in any discipline a "knot", something that no one really likes because it gets in the way. If we lived in a two-dimensional world (and, perhaps, many of us still do because we have not taken on 3D technology), many ordinary knots—such as the ones that sailors know well—would simply untie if our two-dimensional selves could climb the "dimension ladder" one more rung up to 3D: that extra degree of freedom and motion unknots the knotted. Just as two-dimensional knots untie in three-dimensions, the intellectual "knots" we know face in so many fields of our understanding will simply "unknot" when we move into the 3D world and make use of the tools it gives to open up our understanding and involvement.