

Preface

Teaching is perhaps one of the most ancient practices. Ever since we have had societies and social behaviors, we have felt the need of transmitting our experience to others. At the beginnings of intelligent societies, humans were able to transmit only procedural knowledge. Actions such as hunting, hiding or creating a safe place where to sleep were perhaps some of the first subjects transferred from a father to a son or between friends. As humanity evolved, so did our procedure for exchanging information. Communication soon took over in order to exchange not only procedural but also episodic and semantic types of notions. Such novelty allowed humans to tell stories to peers or their offspring. The fact that we were able to not only exchange the knowledge of motions but also of facts marked a decisive milestone in the history of the world and humankind. Of course progress did not stop as we started being able to transfer procedural and episodic memories. Writing such facts and algorithms on a physical medium that could be kept in time was yet another milestone in the development of humankind. The one person who knew so much now could change not only the lives of the people who followed her or him, but many others were able to gain their knowledge by reading what such person wrote.

The facts and milestones of education are countless: typeset print, binding for books and colored inks are just small parts of a story that leads to these days. The way in which we attempt to transmit information to those who wish to learn are utilizing a record number of means. When we see someone walking down the street with headphones on, we generally assume they are listening to music; what if they are listening to a recorded lecture? When parents see their child having fun while playing colorful videogames they may start shaking their heads, wondering how they could limit the time spent in front of a computer or a television; what if that child was interacting with software created specifically for supplementing the material studied in class? Technology has helped us move forward in the way teachers deliver information to students by light years, considering what difference multiple colors of ink printed on paper made for anatomy students all around the world. We are now able to watch videos on music players that perhaps show us how the heart behaves as different pathologies exist. We could listen through our headphones at the different beats and simulate cardiac stress, if we wished.

By no means is the state of technology as applied to teaching a point of arrival, it is merely a milestone that records yet another advancement. Years from now we will have solutions that today we cannot embrace even as science fiction. But today is where we live, and we are laying the foundations for the future. Some prefer working with audio files, others with static Internet-based technologies, and others more with advanced 3-dimensional interpretations of concepts that also use Internet-based technologies to exchange information. The idea of a multi-user virtual environment, or MUVE, has had a significant boost in importance and usage over the last several years. At first, such environments were built for recreational, social and perhaps business uses. Finding better ways to interact with chat partners or to

share white boards with customers and business partners around the world were perhaps some of the goals that drove the development of these technologies. Shortly after, teaching found its way into a new niche, one that allows users to sense the real-time presence of others not only through fast text message responses but also by letting them “see” their peers’ virtual representation.

The idea of Internet-based instruction of course is not a new concept. This form of transmission of knowledge has been thriving in the world of education for years through asynchronous methodologies. The idea of virtual worlds and MUVES breaks the idea of asynchronicity and adds the interactive element to working with others through the Internet. When two people are interacting with a single object through their own virtual representations, or avatars, they are able to see each other. They are able to exchange information and notes directly, or if they wish they can just work on a problem individually. In either case, the technology is not limiting them, but it is enabling perhaps geographically dispersed students to interact. Of course physical distance is not the only reason why virtual worlds and MUVES should be employed; factors such as limited schedules and an illness may also prevent two students from working in person. And yet, we have not even scratched the surface of how these many spaces can be used. Much can still be created and imagined.

Imagine yourself teaching a young audience about Tsunamis. As a matter of fact, some of the survivors from the events that took place in Asia in 2006 have to thank a little girl who recognized the events that precede such catastrophic event, warning the people on the beach early enough. Some teachers are blessed with classrooms filled with students who have a rather active fantasy and are very receptive to auditory cues, thus making a vivid spoken lecture allowing them to understand what the Tsunami looks like. But what if all of our students preferred reading the material and processing it individually? What about the saying, “that a picture is worth a thousand words”? Can we utilize different mediums to teach? Can we use a virtual environment to simulate and show to all our students the warning signs of a Tsunami? Of course we can, and we should. Immersion can be a powerful tool in many contexts. Most of the retention by students comes from interacting directly with the subject matter, perhaps the least is associated with lectures, and yet we keep lecturing. And we lecture about subjects that may be heavily dependent on visual and conceptual cues that are better transferred through images and simulations. The technology is available, why not use it?

Our fascination and curiosity with new technology has often led us into many interesting research areas and projects. This book is one such venture. Several years ago, we became fascinated with virtual environments and the sheer potential they could offer (in many domains, not just limited to an educational context). While there are many applications of the various flavors of virtual reality, our focus naturally started to gravitate to educational uses. When we brainstormed new teaching ideas and the construction of new spaces and learning objects, MUVES seemed to fit perfectly with many of our ideas. While some ideas seemed useful and practical (even easy to implement), but upon use in the classroom, they fell flat. Just like teaching in a traditional classroom or through some type of online content delivery system, some things work perfectly while other approaches just fail miserably leaving a bitter taste of how these technologies could ever be useful. While we all can certainly experiment on our own to see what works, the expertise compiled in this volume is priceless. One of the driving factors for compiling this book was the lack of organized content and a one stop resource for current work on using these types of environments. One often has to search the web for articles, online journals, conference proceedings and individuals websites for answers and ideas. So we hope that this book can help serve as a useful resource with many new ideas, current research and trends with the combined expertise of all of the experts describing their projects and experiences. Many of the chapters also contain many references,

pointing us in the right directions. It is also our hope that this book can serve as a window into a world of innovation brought forth by many new technologies and innovation to those completely new to these ideas, just starting, or to see from a different viewpoint.

Teaching through Multi-User virtual environments: Applying Dynamic elements to the Modern Classroom is meant to highlight the work of educators daring enough to teach in these new frontiers of education. It is with great appreciation to all the contributors of this book, to be able to present their excellent ideas, work and various perspectives. The book is divided into four main parts, each with its own focus. Section one starts us on our journey by focusing on various educational constructs, foundations and literature related to virtual environments, general technology and teaching. Section two contains many chapters related to teaching and learning in virtual worlds from the perspective of many different disciplines. The chapters in this section range from the theoretical, to case studies and even to experimentation. The third section deals with using multi-user virtual environments for teaching foreign language. Many here see the benefits of these types of tools through immersion and interaction. It's interesting to see how the chapters in section three share a similar theme and objective, but each set of authors have very different approaches, focuses and perspectives. Finally in the section four, we see many interesting applications of these technologies in diverse range of areas. Through these four sections, it is our hope that we can inspire more readers to explore new technology in creative and useful ways.

Section 1: Ideas, Perspectives and Education, highlights main concepts just as the section heading implies. Here various ideas, perspectives and educational backgrounds are presented. In *Overcoming Objections to MUVES in Education*, Dr. Laughlin points out common objections to the use of these technologies for education. It seemed like a perfect starting point, as readers can examine this chapter to gain insight on why these objections arise and what can be done to support the use of MUVES. In *The Recursive Knowledge Development Model for Virtual Environments*, Adams and DeVanny discuss concepts and important instructional strategies for student engagement in virtual environments as well as their Recursive Knowledge Development model. Duruz presents *The Techno-Pedagogical Context of Distance Learning: Conceptual Roots*, where he discusses many of the technical and historical components of education based technology and tools providing readers with a throughout background while focusing on pedagogical issues. In *ICT Applications in U.S. Higher Education* by Crosby-Nagy and Carfora, we are given insights related to Information and communication technologies for education with an emphasis on MUVES. In Adam's chapter, *Digital Intelligence: A New Way of Knowing*, we see a theoretical framework for multiple intelligences and discussions on knowledge and how new technologies are changing our concepts and educational practices. In the final chapter in this section, Alegre and Villar present in their chapter, *Faculty Professional Learning: An Examination of Online Development and Assessment Environments*, the FEPLP Model (Faculty Electronic Professional Learning and Portfolio). They focus on faculty development, interaction, and provide reflections on campus e-learning experiences.

Next we see how virtual environments can be utilized in various contexts. Several chapters in this section offer valuable resources, advice, case study methodologies and application on their related domain.

Section 2: Elements of Education in Virtual Environments provides many avenues of exploration related to MUVES. Starting this section, Cunningham and Harrison's chapter *The Affordances of Second Life for Education*, explore how technologies like Second Life can be used and applied to learning. They discuss how Second Life can be used in meaningful ways, but also how these same ideas can be adapted to other technologies. Next in *Learning in Virtual Worlds: A Situated Perspective*, Santos examines the advantages of learning in these new mediums as it relates to the situated learning paradigm. The

author also provides various recommendations and research questions as it relates to learning in virtual worlds. Authors Tsiatsos, Konstantinidis, Terzidou, Ioannidis and Tseloudi compare in their chapter, *CSCL Techniques in Collaborative Virtual Environments: The Case of Second Life*, several virtual environment platforms. Based on their findings, they discuss Second Life and their case study. Next, in *Designing Web-Based Educational Virtual Reality Environments*, Dimitropoulos and Manitsaris discuss the benefits of using virtual reality technologies for education, emphasizing the design and developments of online virtual learning environments. They also talk about a VR environment that can be used for distance education in the realm of medicine. Chapter eleven by Stephen Schrum, *Teaching in the Virtual Theatre Classroom*, presents his Theater Technology course and how MUVES can be used in theater education. Authors Di Fiore, Quax, Lamotte and Van Reeth describe how long term sick children can participate in a regular school classroom as part of their ASCIT project in the chapter, *Case Study of ASCIT: Fostering Communication through Interactive Technologies for Long Term Sick Children*. The Staging Second Life project presented in the chapter, *Staging Second Life in Real and Virtual Spaces* by Fewster, Wood and Chafer present work by the authors related to a visual theater course as students experimented with the correlations of real life and Second Life using it as a hyper-medium. Concluding section two, Denise Wood's chapter *The Benefits and Unanticipated Challenges in the Use of 3D Virtual Learning Environments in the Undergraduate Media Arts Curriculum*, describes the benefits and often unanticipated challenges engaging students in 3D environments. Dr. Wood describes her findings from trials from three undergraduate courses.

Shifting our focus to learning foreign languages through MUVES, in **Section 3: Perspectives of Language Learning**, the authors of the chapters contained in this section focus on Language Learning. *Task Design for Language Learning in an Embodied Environment* by Sweeny, Palomeque, Gonzalez, Speck, Canfield, Guerrero and MacKichan is one such chapter. Drawing from their expertise and experience in this area, they discuss the affordances of MUVES and the theoretical frameworks needed to be successful, concluding with examples related to task design. Next is Sykes chapter, titled *Multi-User Virtual Environments: User-Driven Design and Implementation for Language Learning*. Here the author discusses the necessary skills for learning a second language through MUVES as well as discussing a study on a MUVE built for learning Spanish pragmatics followed by empirical findings and lessons learned from classroom use. In *Foreign Language Instruction in a Virtual Environment: An Examination of Potential Activities* by Regina Kaplan-Rakowski describes the author's experiences using Second Life as a supplement for classroom instruction in a foreign language course. Many activities and practicalities are outlined in this chapter. The last chapter of this section written by Feng and Song, *Education-Oriented Research Activities Conducted in Second Life* discuss how the platform can be used to enhance student collaboration and learning, while providing an overview of foreign language instruction related to various learning paradigms.

In the fourth division of the text, **Section 4: Techniques, Applications and Designs for Education Using Virtual Environments**, contains many insightful chapters relating to various types of design issues, applications, cases and uses of virtual environments and digital representations. In the chapter by Miller, Lee, Rogers, Meredith and Peck titled *Enhancing Tertiary Healthcare education through 3D MUVE-Based Simulations*; readers are provided with the details of the authors' current research and experiences in the area of educational healthcare simulations. They also provided a grounded theoretical background for online learning, constructivism and simulation based learning. Next we are presented with a chapter regarding learning Inorganic Chemistry via Augmented Reality. In the chapter *New Augmented Reality Applications: Inorganic Chemistry Education* by Manuela Núñez Redó, Arturo Torres, Ricardo

Quirós, Inma Núñez Redó, Juan Carda Castelló and Emilio Camahort, we see how augmented reality and 3D models can be used as an educational tool to grasp complexity. The authors describe the details of their project the results of a survey. Sampaio, Henriques, Cruz and Martins in *Interactive Models Based on Virtual Reality Technology Used in Civil Engineering Education* discuss how this technology can be used as a complement to 3D modeling. The chapter includes a discussion of how Civil Engineering education can be enhanced through virtual spaces and 3D models. DeMers explains in *Subject Matter Content Creation for Second Life Delivery: Teaching GIS in Second Life*, how instructors can use such platforms for content delivery, especially with GIS via learning objects. The author discusses various examples of in-world learning objects and how traditional course content can be tailored for exercises in virtual environments. *New Life for Corporate Training* by David Dannenberg explains how environments like Second Life can be used for corporate training and development programs. After a discussion of related ideas and research within this domain, we see how and why such a platform can be a powerful tool for corporate learning programs. Nick Flor in his chapter, *Self-Developing a MUVE for Research and Educational Innovations*, we get a look at how we can create our own virtual environments from the ground up. The author discusses important skills such as: modeling, texturing, animation and programming. Concluding section four, authors Barchetti, Bucciero and Mainetti describe the author's experiences and development of WebTalk as it relates to Collaborative Learning Environments.

In today's information rich society where we are dependent on computers, mobile devices and of course the Internet, have become accustomed to these elements as the norm. In other cases however, certain areas of society still see technology as "bad" or as a non beneficial element. And others see technological innovation as detrimental; promoting "quality" while preserving the essential methodologies of the past. Education is one area where technological and pedagogical innovation is key to the future success of the educational process. More importantly though, for the future of today's students and for the educators teaching today's digital natives we should embrace, not only new ideas and technologies, but useful ones. What is the next step in the evolution of Education? Many agree that the Internet and Web-based distance learning have changed the face of education forever. By simply looking at the chapters contained in this volume we can clearly see a shift in direction with the many fascinating research directions by the contributors here.

Unbridled by the physical constraints of both time and space of the typical classroom, virtual spaces transcend many limitations of presence and physicality. Without getting into the details of an agreed upon definition of "what is digital" or "virtual", or how we precisely define these sometimes intangible or indescribable notions, I think many will agree of its application. Often when explaining or describing virtual worlds to our students, we strongly encourage them to experience these spaces for themselves. Despite all of the video clips, graphics and sensory rich text descriptions of these places, one needs to experience them to truly understand the potential. For anyone not accustomed to virtual environments, we hope at least from reading this volume that your interest is peaked enough to experiment with these fascinating mediums. Again, it is with a sincere "Thank you!" to all the contributors willing to share their research and expertise to make this edited book possible and to those daring to explore new technologies.

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