Preface

The introduction of computer systems in various segments of research contributed to the emergence of new perspectives and paradigms in various industries. In education, this insertion contributed to the emergence of new practices of teaching and learning process, and also facilitated the process of creating, searching, and sharing educational materials, communication between students and teachers, application assessments, and others. With this support, it becomes possible to automate some processes that previously could only be done manually, thus facilitating the work of the teacher, and therefore favors the insertion and use of new services. However, even with all the technological apparatus, the number of dropout students in the modality of distance education in undergraduate and graduate programs is high. This number is expected to increase further. Therefore, researchers have increasingly applied techniques of artificial intelligence, software engineering, multimedia systems, and others; so that technology enhanced learning systems that support education can support students and have a range of features for these. Then, the learning process becomes easier and more enjoyable, thus seeking to reduce the high dropout rates of those. Soon, so there may be an enhancement of those services that support distance learning, techniques like augmented virtual reality, display of hypermedia educational and personalized treatment for each student have been increasingly used.

Technological advances have contributed increasingly to mass diffusion of knowledge, which therefore has aided the process of knowledge and allowed the inclusion of new paradigms in the teaching and learning process. However, this diffusion of knowledge is not sufficient by itself to promote iterative, virtual reality and the personalized treatment to students because, for this to be achieved, it is necessary to take into account several factors, such as: context and preferences student, the increased sense of hyperrealism, interactivity, and others; which together activate the interest, motivation and memory of students. Therefore, one of the most used techniques to provide interaction and the hyperrealism is the use of three-dimensional environments. The three-dimensional virtual environments are environments that display the images in three dimensions, allowing the user to have depth perception and can also interact with it. As for scenarios, 3D virtual environments can simulate a real environment or an entirely fanciful and abstract environment. For the display of educational content can be potentiated in these environments, the use of hypermedia content has proven to be a good option. The hypermedia is the union of the forms that allow simultaneous access to images, texts and sounds of interactive mode that can once connected by random links, generating a multitude of possibilities. Thus, this combination of hypermedia with 3D environments generates a high level of interactivity and a sense of hyperrealism. However, these emphasize the high interaction and representation of objects not ensuring personalized attention to students, so, the application of ubiquitous learning environments techniques can fill this gap. Ubiquitous learning takes into account the context, characteristics, behavior and preferences of the
Preface

students so that the system can provide content and features tailored for them regardless of location and time of access. Thus, the combination of virtual 3D learning environments with learning environments reflects the emergence of new possibilities in the teaching process, and trespass the limits of traditional virtual environments that support this process.

Following this perspective, this book is organized into two sections. The first section presents to the reader what is most modern in educational techniques supported by three-dimensional virtual learning environments, while the second section presents the actual and future trends on hypermedia and educational environments that support ubiquitous learning.

SECTION 1: THREE-DIMENSIONAL VIRTUAL LEARNING ENVIRONMENTS

The traditional tools that support education systems do not meet the specific requirements for any type of situation. Furthermore, when compared to techniques such systems with existing techniques in representing models and knowledge, one realizes that these systems do not enhance the new teaching practices. So one of the ways to increase the degree of abstraction of the actual environment by the virtual environment is through the use of three-dimensional environments. A three-dimensional environment is a virtual scenery in three dimensions, which is modeled by computer graphics techniques. These environments enhance the degree in the representation of real objects in the virtual world and the feeling of realism. Thus, once applied to teaching, these environments are called Virtual Learning Environments, that through the use of techniques of artificial intelligence, multimedia systems, and others, promote educational opportunities through simulations, collaborations among users, immersive interactions and non-immersive, and so on, thus contributing to the emergence of new perspectives and possibility in the teaching and learning process.

SECTION 2: EDUCATIONAL HYPERMEDIA AND UBIQUITOUS LEARNING: FUTURE TRENDS

The representation of data through a digital format has always been an object of study by the systems analysts. The increase in capacity of the processing, storage and communication of data contributed to the rise of several ways to store and display such content for users of the software system. However, once applied techniques to the interactive access media that store content, these media receive the nomenclature of hypermedia. So, the hypermedia is a combinatorial and interactive multimedia in which texts, sounds, images and videos are linked together by links and mobile probabilistic so as to compose unstable construction in infinite amounts. When applied to education, the media are called educational hypermedia, and these, when applied properly in virtual learning environments, contribute to the emergence of new possibilities and perspectives in these environments. The increased use and diffusion of Web technologies and the ubiquity of educational tools has provided advances in learning environments. Due to advances in technology, it becomes possible to treat students in a personalized manner according to their characteristics and preferences. Thus, environments that support this personalized treatment of the student according to their context in a mobile environment are called ubiquitous learning environments. The ubiquitous learning (or u-learning) provides students with a teaching method that would not be possible to be performed in a conventional web systems. The u-learning environment can be understood
Preface

as a context sensitive mobile learning environment, providing the most adaptable content for students. There is no consensus on the definition of the context notion. This is a specific application and desired intent, requiring the identification of the functions and properties of the individual domains. Therefore, this section aims to present the future trends of computer systems that support the ubiquitous learning beyond the 3D virtual environments and educational hypermedia.

This book will be beneficial and useful primarily for researchers, developers and teachers working in the areas of three-dimensional virtual environment, augmented virtual reality, hypermedia content and ubiquitous learning. Due to its scope, this will also serve the public in education and related disciplines. Will be useful yet for professional developers of 3D environments and educational games, so that it gets a reference on what is most modern currently, and give a vision of new trends and possibilities. Thus, the contribution of this book is immeasurable, as it will allow that new researches be conducted adopting the methodologies, techniques and papers presented here. Computer Graphics is an interdisciplinary area that really strives to create a better representation of the real world through the virtual world. Thus, such techniques applied in support of learning mediated by the computer generate new expectations and opportunities in various segments. Therefore, this book is aimed at a broad audience, including researchers, students, educators and industry trainers interested in various disciplines such as computer graphics, education, cognition and didacticism applied to education.

We can find in the literature several methodologies of modeling and construction of 3D virtual environments and hypermedia. However, there are few studies presenting these environments focused on supporting ubiquitous learning, and this number tends to decrease further in relation to those who present trends and future prospects of this area. Therefore, the proposed book will fill this gap bringing together the best research of 3D virtual environments and educational hypermedia applied on ubiquitous learning, and at the same time can present new trends in this area, so that it becomes a point of departure to the new investigations of this research segment.

Francisco Milton Mendes Neto
Rural Federal University of Semi Arid, Brazil

Rafael Castro de Souza
Rural Federal University of Semi Arid, Brazil

Alex Sandro Gomes
Federal University of Pernambuco, Brazil