Preface

In the information digital society, the advancement of Information and Communication Technologies (ICTs) has created a broadened scope of sharing innovations globally by digital citizens. In this global digital society, people use electronic devices in almost everything they do: from brushing their teeth to driving a car. In this fast moving digital society, people are encountering newer features associated with emerging technologies including (but not limited to): computers, all kinds of appliances and machines, mobile communication devices, software applications, social media, and websites. With all these advances in emerging technologies coupled with fast paced lifestyles, people are increasingly overwhelmed with various electronic devices and services. What do users of these various digital devices and services really need? They need useable and adaptable interfaces to operate in these virtual environments.

When I was asked by IGI Global to edit this book on user interface design, I was very excited, honored, and intrigued. I was *excited* and *honored* because the themes and the purpose of the book fall under my forthcoming publication plan which is to author/edit eight different books using the eight dimensions of the *Virtual Learning Framework* (see below). I was *intrigued* as I do not claim to be an expert in interface design but as it is one of the eight dimensions. However, it took some convincing from the publisher and several of my colleagues who convinced me that my research and interest on critical issues associated with the design of open and distributed learning environments are definitely useful to the user interface design for virtual environments.

Since 1997, I have been studying the question "*What does it take to provide meaningful Virtual Learning Environments (VLEs) for learners worldwide?"* Through my research I found that numerous factors help to create a meaningful VLE, and many of these factors are systemically interrelated and interdependent. I clustered these factors into eight dimensions (institutional, management, technological, pedagogical, ethical considerations, interface design, resource support, and evaluation) and created *A Framework for Virtual Learning* (http://badrulkhan.com/framework). Designing interfaces for VLEs cannot be accomplished by addressing only the issues relevant to the interface design dimension. One must recognize the interrelationships and interconnectedness with the issues of the seven other dimensions of the Framework. Therefore, I have included chapters focusing on comprehensive issues of challenges and advances of VLEs in this book.

To some, the term "virtual environment" may sound as if it applies only to 3-dimensional virtual worlds, so I feel it is important to clarify that, in this book, VLEs include both two dimensional (2D) and three dimensional (3D) virtual spaces. Therefore, chapters in the book are inclusive of both kinds of virtual environments.

I am very fortunate to have researchers and practitioners involved in VLEs as contributors of this book. As the editor of this book, I took an open and democratic approach to solicit contributions. I sent e-mail

messages to potential authors and also cross-posted a message to several listservs soliciting contributions for the book. As a result, I put together this book by incorporating works of talented individuals with unique backgrounds from around the globe. It should also be noted that there are many significant people involved in doing research in virtual learning who are not included in this book.

The *purpose* of this book is to provide the reader with a broad understanding of issues relevant to user interface design (one dimension of the Framework) of virtual environments. Chapters included in this book attempt to address various critical issues that have implications for user interface design, and offer a variety of points of view on those issues. Below, I present a brief description of each chapter of the book:

1. In the introductory chapter entitled "*Virtual Learning Environments: Design Factors and Issues*," I argue that designing interfaces for VLEs cannot be accomplished by addressing only the issues raised based on the interface design factors. Other VLE factors (i.e., institutional, management, technological, pedagogical, ethical, resource support, and evaluation) are systemically interrelated and interdependent with interface design factors. Therefore, for a meaningful VLE design, it is very important to recognize the interrelationships and interconnectedness of factors in addressing issues conducive to learning.
2. **Gupta and Chen** (*Understanding Evolution of Virtual Worlds Research: A Content Analytic Approach*) present six dominant themes of research on virtual worlds and then content-analyze extant literature to show how several themes have emerged in research on virtual worlds. This presents unique insights into perceived relative importance of impact of different aspects of virtual worlds on individuals and organizations alike.
3. **Curnow, Henson, and Wisher** (*User Interface Designs, Task Categories and Training*) focus on a preliminary framework for learner centered user interface design across a variety of training categories. The overarching premise of the framework is that designs that are compatible with the psychology of learning promote learning and ultimately perform better than those that do not. The framework results in a notional configuration of 27 learner centered training interfaces, which are analyzed for their relevance to user interface design.
4. **Carroll** (*Exploring Past Trends and Current Challenges of Human Computer Interaction [HCI] Design: What Does This Mean for the Design of Virtual Environments?*) investigates the potential of aesthetics in the design of Human-Computer Interaction (HCI). In particular, the chapter aims to provide a means by which aesthetics can be applied in photorealistic virtual reality (VR) to create engaging experiences.
5. **Ciampi, Coronato, De Pietro, and Gallo** (*Architectural Models for Reliable Multi-User Interfaces*) describe a system for providing interaction interoperability among multi-user interfaces. Rather than focusing on the de-coupling of input devices from interaction techniques and from interaction tasks, they suggest integrating interactive systems at higher level through an interface standardization. The chapter also presents a case study in which an agent-based middleware is used to support developers in the interconnection of monolithic applications.
6. **Santos, Mazzone, Aguilar, and Boticario** (*Information Architecture for the Design of a User Interface to Manage Educational Oriented Recommendations*) presents the user centred design process of the administration tool for educators using a recommender system in virtual learning environments. The aim of this tool is to facilitate the involvement of educators when personal-

izing the learning experience for their students, in order to make the educative process as simple, meaningful, and efficient as possible.

7. **Özel** (*Utilizing Cognitive Resources in User Interface Designs*) focuses on multiple representations and cognitive perspective about presenting information via different modes in user interface design. Research studies indicate that providing accurate representations increases users' recognition of information. Moreover, presentation of one concept in multiple modes improves concept acquisition. Developing an understanding of how concept acquisition occurs requires knowledge about cognitive information processing and brain functioning.
8. **Stedmon** (*Designing Usable Speech Input for Virtual Environments*) provides guidelines derived from a number of sources that would appear to reinforce widespread common sense conventions and even anecdotal evidence for speech interface use. He emphasizes on the need to generate a much better understanding, from a user-centered perspective, and better organization of guidelines to make them more universally applicable.
9. **Gamor** (*Exploiting the Power of Persistence for Learning in Virtual Worlds*) addresses the criticality of using "persistence" in order to design a meaningful, lasting learning experience in a virtual world. The chapter examines how to optimize the user interface for "persistence" using sound instructional design strategies.
10. **Badie, Kharrat, Mahmoudi, Mirian, Ghazi, and Babazadeh** (*Ontology-Driven Creation of Contents: Making Efficient Interaction between Organizational Users and Their Surrounding Tasks*) discuss a framework to create contents for helping organizational tasks based on an interplay between the ontologies of the key segments and the problem context. The focal point in this regard is using the linguistically significant notions to be adjusted separately for each key segment once a certain organizational task is faced.
11. **Patel and Vij** (Unconstrained Walking Plane as Locomotion Interface to Virtual Environment) discuss how the design of a locomotion interface to the virtual environment for spatial learning is aimed at providing unconstrained walking plane for building improved cognitive map and thereby enhancing mobility skills of persons with limited vision. The structure of the interface, and control mechanism of the device are presented, and discussion of advantages and limitations of the interface is given.
12. **Quinton** (*Redefining the Role and Purpose of Learning*) presents a philosophical treatise on the design of electronic learning environments in the future. The uniqueness of the theory of learning to emerge from this exploration lies in its capacity to dynamically adapt and evolve in response to the changing expectations of the teacher and the changing learning needs of the student.
13. **De Kervenoael, Bisson, and Palmer** (*Are Web Designers Resisting the Inclusion of Social Cues When Creating Website User Interface?*) discuss how Web designers through their daily practices, (i) adopt recursive, adaptive and resisting behavior regarding the inclusion of social cues online and (ii) shape the socio-technical power relationship between designers and other stakeholders. Five vignettes case study with expert individual web designers are used. Findings point out at three types of emerging resistance, namely: market driven resistance, ideological resistance, and functional resistance.
14. **Ally** (*Designing Mobile Learning for the User*) discusses learning strategies for mobile learning, and provides several design principles for the development of mobile learning materials to maximize the amount learned and to meet the needs of the user.

15. **Railean** (*Issues and Challenges Associated with the Design of Electronic Textbook*) investigates issues associated with the design of electronic textbook and describes metasystems learning design (MLD). This paradigm argues the transition from closed pedagogical systems to more open educational systems. The core element of MLD is the pedagogy of competence development triggered electronic textbook. The functionality of MLD is assured by a flexible and dynamic instructional strategy. This new strategy provides an operating framework both for teachers and for learners through self-regulation assessment.
16. **Collins** (*Using a Blueprint in the Design of Instruction for Virtual Environments*) discusses the instructional design aspects of designing learning in virtual worlds. The chapter presents a relatively straightforward instructional design framework that stresses the alignment of learning outcomes, learning activities, and assessment/feedback.
17. **Vallance** (*Design and Robots for Learning in Virtual Worlds*) states that the meme of the physical university is changing and moving swiftly, due mostly to virtual technological developments, towards the "multi-versity" where Higher Education Institutes will exist in both the real world and a virtual space. This chapter summarizes the theoretical and technical progress of research in the iterative, leaner centered design of virtual tools and associated tasks for evidencing the processes of learning (witnessed as measurements of six cognitive processes and four knowledge dimensions) of participants communicating the programming LEGO robots within a virtual world.
18. **Tyczkowski, Bauman, Susan Gallagher-Lepak, Vandenhouten, and Reilly** (*An Interface Design Evaluation of Courses in a Nursing Program Using an E-Learning Framework: A Case Study*) present a case study that uses a checklist of interface design issues to conduct a formal analysis of the five core online courses taught in the BSN@HOME collaborative. Such an analysis was aimed at identifying strengths and areas for improvement of the program.

It is important to note that user interface design for newer and constantly emerging virtual environments will be challenging. However, sharing of knowledge among VLE researchers and practitioners about "what works and what does not work" provides useful guidance for advancing the field.

Hopefully, this collection of ideas and issues discussed by international authors will help practitioners understand various aspects of the meaningful design of VLEs and provide valuable guidance in creating VLEs for the target audience. I would appreciate hearing comments regarding this book.

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