Preface

The Artificial Intelligence and Education is an ever-growing research area. It uses artificial intelligence tools and techniques to provide the foundations for intelligent tutoring and learning systems. The main research objective consists of using the computer-based technology to examine, discuss and fosters the processes of cognition, learning, teaching and so forth. It supports and develops innovative teaching methods and learning systems.

The goal of this volume has been to offer a wide spectrum of sample works developed in leading research throughout the world about innovative methodologies of artificial intelligence in education and foundations of engineering educational intelligent systems as well as application and interesting experiences in the field. The book should be useful both for beginners and experienced researchers interested in applying computational intelligence to the educational process.

In Chapter 1, which is entitled *A Framework for Building a Knowledge-Based System for Curriculum Design in Engineering*, the author demonstrates that the methodology of Knowledge-Based Systems can be applied to Curriculum Design. A general framework was devised to carry out the process of building this Knowledge-Based System with the domain of Curriculum Design divided into several subdomains. A strategy was developed and applied to investigate these interdependent subdomains independently.

In Chapter 2, which is entitled *A Web-based Authoring Tool for Intelligent Tutors: Blending Assessment and Instructional Assistance*, the authors cover the web-based architecture through which students and teachers interact and the Builder application, used internally to create the content. The authors report on the designing of the content and the evaluation of the assistance and assessment that the Assistment system provides.

In Chapter 3, which is entitled *Alife in the Classrooms: an Integrative Learning Approach*, the author applies Alife systems (Artificial Life) to the

integrative learning of computation, biology, mathematics and scientific epistemology (methods, practices ...) in the classroom.

In Chapter 4, which is entitled *Pedagogic Strategies Based on the Student Cognitive Model Using the Constructivist Approach*, the authors assess whether it is possible to design pedagogic strategies based on models of conscience awareness and use them, by means of intelligent agents.

In Chapter 5, which is entitled *Tracing CSCL Processes*, the authors present the experience they have developed using a software tool called TeamQuest that includes activities that provide the opportunity for students to examine the performed task from different perspectives, needed to enable learners to make choices and reflect on their learning both individually and socially. The authors include a model that intend to evaluate the collaborative process in order to improve it based on the permanent evaluation and analysis of different alternatives.

In Chapter 6, which is entitled *Formal Aspects of Pedagogical Negotiation in AMPLIA System*, the authors present a pedagogical negotiation model developed for AMPLIA, an Intelligent Probabilistic Multi-agent Learning Environment. AMPLIA focuses on the formal aspects of the negotiation process, trying to abstract the most general characteristics of this process.

In Chapter 7, which is entitled *A New Approach to Meta-Evaluation Using Fuzzy Logic*, the authors present a methodology proposed and developed in Brazil for meta-evaluation that makes use of the concepts of fuzzy sets and fuzzy logic. It allows for the use of intermediate answers in the process of data collection. The proposed methodology allows: (i) the respondent to provide correct answers that indicate his (her) real understanding with regard to the response to a certain standard; (ii) to use linguistic rules provided by specialists, even with contradictory thinking; (iii) to deal with the intrinsic imprecision that exists in complex problems such as the meta-evaluation process.

In Chapter 8, which is entitled *Evaluation of Fuzzy Productivity of Graduate Courses*, the author intends to bring elements to the discussion of productivity measurement issues specially important in the evaluation of the Master courses. A main concern of CAPES, Brazil evaluation system is on not gauging results without taking into account the volume of resources applied. The fuzzy productivity measures are defined and key concepts of randomness and dependence are discussed. The author develop the procedures to be applied to completely quantify the productivity measures.

We are very much grateful to the authors of this volume and to the reviewers for their tremendous service by critically reviewing the chapters. The editors would also like to thank Prof. Janusz Kacprzyk, the editor-in-chief of the Studies in Computational Intelligence Book Series and Dr. Thomas Ditzinger from Springer-Verlag, Germany for their editorial assistance and

excellent collaboration to produce this scientific work. We hope that the reader will share our excitement on this volume and will find it useful.

March 2006

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