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Preface

This book follows from the International Conference on Intelligent Tutoring Systems (ITS-88) held June 1–3, 1988 in Montréal, Canada. It contains a selection from the best papers of ITS-88. The authors who have contributed have improved and extended the paper they presented at the conference.

The goal of the conference was to bring together specialists from the fields of artificial intelligence and education, two strong and convergent domains of research which need, more and more, collaborative works. Both disciplines tackle fundamental and ambitious goals and the expertise developed by the two research communities is proving to be complementary and fundamental in contributing to the study of a very complex subject: mental behavior of the human being.

The conference was launched to encourage a close cooperation between the two research communities and to focus on high-level concepts and ideas in order to serve as a strong reference basis for future research. We were also curious to see the state of development of ITS in the world. The response from the international community largely met our expectations: We received 142 communications from 16 countries. To insure a high level at the conference a strong international committee (from eight countries) was set up by Marlene Jones (Alberta Research Council) and Gregor Bochmann (University of Montréal). All contributed papers were assigned to several members of the Program Committee for evaluation. In most of the cases, the papers were reviewed by five referees. In addition, a large number of high-level speakers have been invited to present the State of the Art in different research areas: Jacques Arsac, Patrick Suppes, John Seely Brown, Philip Winne, Elliot Soloway, John Self, Jeffrey Bonar, Beverly Woolf, and Masoud Yazdani. Two panels conducted by Stuart Macmillan and Gordon McCalla including Albert Corbett, Stellan Ohlsson, Elliot Soloway, Patrick Suppes, Beverly Woolf, Marlene Jones, William Clancey, Gerhard Fisher, and David Littman led to stimulating discussions. The success of the conference was greatly due to the contributions of the speakers and the panelists.

Several scientific organizations gave us their support: the Canadian Society for Computational Studies of Intelligence (CSCSI), the Association française pour la cybernétique économique et technique (AFCET), the Association for Computing Machinery (ACM) and its special interest groups SIGART and SIGCUE, the Inter-American Organization for Higher Education, and the British Computer Society (BCS).

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Introductic

The evolution from Computer-Aided Instruction (CAI) to Intelligent Compı Aided Instruction (ICAI) was the first step by which Education and Artif Intelligence communities began to look at each other's work. The impoı contributions from artificial intelligence came from the studies on knowle knowledge acquisition, knowledge communication, knowledge models, kn edge misunderstanding, expert knowledge, and so on. They address fundame issues related to the wide and complex domain of education of the human be We can think of the evolution towards Intelligent Tutoring Systems (ITS) step beyond ICAI, leading to new classes of problems and approaches and wl learning is at least as important as teaching. ITS involves artificial intellige concepts including knowledge representation and communication, probl solving approaches, dynamic student modeling, human cognition, intelli; user interfaces, intelligent help systems, use of strategies, and so on.

As work progresses in these areas, various research has uncovered comı problems requiring fundamental studies. We do need to capture more knowle about several fundamental components of ITS and several questions arise: W is the influence of the learning environment in an ITS? What are the tools wl could improve the learning process? What are the means to obtain a m adequate model of the student? How could we advise and help the student ir intelligent way ? What strategies should an intelligent learning system u Finally, what have we reached in AI and Education and what is the magnitud the difficulties in the present ITS research?

This book examines all of the above-mentioned questions. Thirteen chap address several fundamental aspects of ITS: the learning environment in wh the student is placed, the student modeling problem, the planification of content of instruction, the teaching and learning strategies, and finally we tak look at the near (and not so near) future.

LEARNING ENVIRONMENT

Tak-Wai Chan and Arthur Baskin (Chapter 1) propose intelligent tutoring s tems of a new breed—the Learning Companion Systems (LCS). In the learn environment of such a system, there are three agents involved, namely, human student, the computer learning-companion, and the computer teach The role of the computer learning-companion is to act as a learning compan for the student. To this end the companion performs the learning task at about same level as the student, and both the student and the companion exchar ideas while being presented the same material by the teacher. The goal of