Lecture Notes in Computer Science 3143

Commenced Publication in 1973
Founding and Former Series Editors:
Gerhard Goos, Juris Hartmanis, and Jan van Leeuwen

Editorial Board

Takeo Kanade
  *Carnegie Mellon University, Pittsburgh, PA, USA*

Josef Kittler
  *University of Surrey, Guildford, UK*

Jon M. Kleinberg
  *Cornell University, Ithaca, NY, USA*

Friedemann Mattern
  *ETH Zurich, Switzerland*

John C. Mitchell
  *Stanford University, CA, USA*

Moni Naor
  *Weizmann Institute of Science, Rehovot, Israel*

Oscar Nierstrasz
  *University of Bern, Switzerland*

C. Pandu Rangan
  *Indian Institute of Technology, Madras, India*

Bernhard Steffen
  *University of Dortmund, Germany*

Madhu Sudan
  *Massachusetts Institute of Technology, MA, USA*

Demetri Terzopoulos
  *New York University, NY, USA*

Doug Tygar
  *University of California, Berkeley, CA, USA*

Moshe Y. Vardi
  *Rice University, Houston, TX, USA*

Gerhard Weikum
  *Max-Planck Institute of Computer Science, Saarbruecken, Germany*
Volume Editors

Wenyin Liu
City University of Hong Kong, Department of Computer Science
Kowloon, Hong Kong
E-mail: csliuwy@cityu.edu.hk

Yuanchun Shi
Tsinghua University, Department of Computer Science and Technology
Beijing 100084, China
E-mail: shiyc@tsinghua.edu.cn

Qing Li
City University of Hong Kong
Department of Computer Engineering and Information Technology
Kowloon, Hong Kong
E-mail: itqli@cityu.edu.hk

Library of Congress Control Number: 2004109597


ISSN 0302-9743
ISBN 3-540-22542-0 Springer Berlin Heidelberg New York

This work is subject to copyright. All rights are reserved, whether the whole or part of the material is concerned, specifically the rights of translation, reprinting, re-use of illustrations, recitation, broadcasting, reproduction on microfilms or in any other way, and storage in data banks. Duplication of this publication or parts thereof is permitted only under the provisions of the German Copyright Law of September 9, 1965, in its current version, and permission for use must always be obtained from Springer. Violations are liable to prosecution under the German Copyright Law.

Springer is a part of Springer Science+Business Media

springeronline.com

© Springer-Verlag Berlin Heidelberg 2004

Printed in Germany

Typesetting: Camera-ready by author, data conversion by Olgun Computergrafik
Printed on acid-free paper  SPIN: 11019794  06/3142  5 4 3 2 1 0
Preface

With the rapid development of Web-based learning and new concepts like virtual classrooms, virtual laboratories and virtual universities, many issues need to be addressed. On the technical side, there is a need for effective technology for deployment of Web-based education. On the learning side, the cyber mode of learning is very different from classroom-based learning. How can instructional development cope with this new style of learning? On the management side, the establishment of the cyber university imposes very different requirements for the set-up. Does industry-university partnership provide a solution to addressing the technological and management issues? Why do we need to standardize e-learning and what can we do already? As with many other new developments, more research is needed to establish the concepts and best practice for Web-based learning.

ICWL 2004, the 3rd International Conference on Web-Based Learning, was held at the Tsinghua University (Beijing, China) from August 8th to 11th, 2004, as a continued attempt to address many of the above-mentioned issues. Following the great successes of ICWL 2002 (Hong Kong) and ICWL 2003 (Australia), ICWL 2004 aimed at presenting new progress in the technical, pedagogical, as well as management issues of Web-based learning. The conference featured a comprehensive program, including a tutorial session, a keynote talk, a main track for regular paper presentations, and an industrial track. We received 120 papers and accepted only 58 of them in the main track for both oral and poster presentations.

A conference like this can only succeed with an excellent team effort. We would like to acknowledge the great contribution from our program committee members and paper reviewers who helped review submitted papers, select high-quality papers, and provide valuable comments for the authors. We are particularly indebted to Dr. Liu Wenyin, the publication chair as well as the tutorial chair, who did much more than what the roles asked him to. Special thanks go to Guo Ling and Xiang Xin, who did wonderful jobs as the conference secretary and Web master, respectively. Sponsorships from Tsinghua University, City University of Hong Kong, CELTSC, and the Hong Kong Web Society are gratefully acknowledged.

May 2004

Maria Orlowska
Dennis McLeod
Xiaoming Li
Qing Li

Shi Yuanchun
Rynson Lau
Tosiyasu L. Kunii
ICWL 2004 was organized by Tsinghua University (Beijing, China) in conjunction with the Hong Kong Web Society.

**General Co-chairs**

Maria Orlowska  
University of Queensland, Australia

Dennis McLeod  
University of Southern California, USA

Xiaoming Li  
Peking University, China

Qing Li  
Hong Kong Web Society, HKSAR, China

**Program Committee Co-chairs**

Shi Yuanchun  
Tsinghua University, Beijing, China

Rynson Lau  
City University of Hong Kong, HKSAR, China

Tosiyasu L. Kunii  
Kanazawa Institute of Technology, Japan

**Steering Committee Liaison**

Joseph S.P. Fong  
City University of Hong Kong, HKSAR, China

**Conference Organization**

**Organizing Chair**
Lizhu Zhou  
Tsinghua University, Beijing, China

**Industrial Stream**
Ronnie Cheung  
Hong Kong Web Society, HKSAR, China

**Treasurer**
Jianhua Feng  
Tsinghua University, Beijing, China

**Publication**
Liu Wenyin  
City University of Hong Kong, HKSAR, China

**Web Master**
Xin Xiang  
Tsinghua University, Beijing, China

**Local Arrangements**
Li Zheng  
Tsinghua University, Beijing, China

**Publicity**
Jianwei Zhang  
Tsinghua University, Beijing, China

**Tutorial Management**
Liu Wenyin  
City University of Hong Kong, HKSAR, China

**Conference Secretary**
Ling Guo  
Tsinghua University, Beijing, China
Program Committee Members

Howard Beck, University of Florida, USA
Stephane Bressan, National University of Singapore, Singapore
Wentong Cai, Nanyang Technological University, Singapore
Jiannong Cao, Hong Kong Polytechnic Univ. HKSAR, China
Shi-Kuo Chang, University of Pittsburgh, USA
Elizabeth Change, Curtin University, Australia
Jo Coldwell, Deakin University, Australia
Tharam Dillon, Sydney University of Technology, Australia
Andrzej Goscinski, Deakin University, Australia
John Hughes, University of Ulster, UK
Ali Hurson, Pennsylvania State University, USA
Horace H.S. Ip, City University of Hong Kong, HKSAR, China
Weijia Jia, City University of Hong Kong, HKSAR, China
Qun Jin, Waseda University, Japan
Feiyu Kang, Tsinghua University, Beijing, China
C.-T. King, National Tsinghua University, Taiwan, China
Reggie Kwan, Open University of Hong Kong, HKSAR, China
Tosiyasu L. Kunii, Kanazawa Institute of Technology, Japan
Rynson W.H. Lau, City University of Hong Kong, HKSAR, China
Sue Legg, University of Florida, USA
Clement Leung, Victoria University of Technology, Australia
Guojie Li, Institute of Computing Technology, China
Keqin Li, State University of New York at New Paltz, USA
Qing Li, City University of Hong Kong, HKSAR, China
Xiaoming Li, Peking University, China
Liu Wenyin, City University of Hong Kong, HKSAR, China
Dennis McLeod, University of Southern California, USA
Christine Morin, IRISA/Université de Rennes, France
John Mylopoulos, University of Toronto, Canada
Maria Orłowska, University of Queensland, Australia
Raul Rojas, Free University of Berlin, Germany
Geoff Romeo, Monash University, Australia
Shi Yuanchun, Tsinghua University, Beijing, China
Timothy Shih, Tamkang University, Taiwan, China
Chengzheng Sun, Griffith University, Australia
Changjie Tang, Sichuan University, China
Y.-M. Teo, National University of Singapore, Singapore
Ulrich Thiel, GMD-IPSI, Darmstadt, Germany
A Min Tjoa, Vienna University of Technology, Austria
Zhiwei Xu, Institute of Computing Technology, China
Zongkai Yang, Huazhong Sci. & Tech. University, China
Jianwei Zhang, Tsinghua University, Beijing, China
S.Q. Zheng University of Texas at Dallas, USA
Lizhu Zhou Tsinghua University, Beijing, China
Wanlei Zhou Deakin University, Australia
Zhitong Zhu Huadong Normal University, China
Yueting Zhuang Zhejiang University, China

**Additional Reviewers**

In addition to all members of the Program Committee, the following people were also involved in reviewing the papers:

Enyi Chen Quanbin Chen Jianhua Feng Ling Guo Jinyu Li
Peifeng Xiang Xin Xiang Xin Xiao Degan Zhang Nan Zhang
# Table of Contents

## e-Learning Platforms and Tools

<table>
<thead>
<tr>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Learning Algorithms with an Electronic Chalkboard over the Web.</td>
<td>1</td>
</tr>
<tr>
<td><em>Margarita Esponda Argüero and Raúl Rojas</em></td>
<td></td>
</tr>
<tr>
<td>The Agile Teaching/Learning Methodology and Its e-Learning Platform.</td>
<td>11</td>
</tr>
<tr>
<td><em>Andy Hon Wai Chun</em></td>
<td></td>
</tr>
<tr>
<td>Activity Theory as Tool for Analyzing Asynchronous Learning Networks (ALN).</td>
<td>19</td>
</tr>
<tr>
<td><em>Jerry Zhigang Li and Sharon Elizabeth Bratt</em></td>
<td></td>
</tr>
<tr>
<td>An Agent- and Service-Oriented e-Learning Platform.</td>
<td>27</td>
</tr>
<tr>
<td><em>Ivan Madjarov, Omar Boucelma, and Abdelkader Betari</em></td>
<td></td>
</tr>
<tr>
<td>Automatically Generating an e-Textbook on the Web.</td>
<td>35</td>
</tr>
<tr>
<td><em>Jing Chen, Qing Li, Liping Wang, and Weijia Jia</em></td>
<td></td>
</tr>
<tr>
<td>Prioritized Admission Control in Multimedia Network-Based e-Learning.</td>
<td>43</td>
</tr>
<tr>
<td><em>Dali Zhang</em></td>
<td></td>
</tr>
<tr>
<td>CUBES: Providing Flexible Learning Environment for Virtual Universities.</td>
<td>51</td>
</tr>
<tr>
<td><em>Peifeng Xiang, Yuanchun Shi, Weijun Qin, and Xin Xiang</em></td>
<td></td>
</tr>
<tr>
<td>Dinosys: An Annotation Tool for Web-Based Learning.</td>
<td>59</td>
</tr>
<tr>
<td><em>Emmanuel Desmontils, Christine Jacquin, and Ludovic Simon</em></td>
<td></td>
</tr>
<tr>
<td>Web-Based Multimedia Authoring and Presentation Framework for Children’s Art Cultivation.</td>
<td>67</td>
</tr>
<tr>
<td><em>Hao-Tung Lin, Yi-Chun Lai, Kuo-Yu Liu, and Herng-Yow Chen</em></td>
<td></td>
</tr>
<tr>
<td>A Progressive Content Distribution Framework in Supporting Web-Based Learning.</td>
<td>75</td>
</tr>
<tr>
<td><em>Frederick W.B. Li and Rynson W.H. Lau</em></td>
<td></td>
</tr>
<tr>
<td>Technologies to Support Collaborative Learning over the Multimedia Home Platform.</td>
<td>83</td>
</tr>
<tr>
<td><em>Martín López-Nores, Yolanda Blanco-Fernández, Ana Fernández-Vilas, Rebeca P. Díaz-Redondo, José J. Pazos-Arias, Alberto Gil-Solla, Jorge García-Duque, Belén Barragáns-Martínez, and Manuel Ramos-Cabrer</em></td>
<td></td>
</tr>
<tr>
<td>Proposal for KML Designer with Web-Based Environment.</td>
<td>91</td>
</tr>
<tr>
<td><em>Chia-Hung Chen, Jun-Sing Jwo, and Chih-Chi Wang</em></td>
<td></td>
</tr>
</tbody>
</table>
AI-Based Teaching Package for Open Channel Flow on Internet .......................... 98
Kwokwing Chau and Yiuhung Sze

Efficient Methods for Skimming the Web-Based Synchronization Multimedia Lectures ................................................................. 105
I-Chun Lai, Kuo-Yu Liu, Hao-Tung Lin, and Herng-Yow Chen

Web-Based Collaborative Learning Focused on the Study of Interaction and Human Communication ........................................ 113
Xinyu Zhang, Nianlong Luo, DongXing Jiang, Huifen Liu, and Wenyi Zhang

PKUSpace: A Collaborative Platform for Scientific Researching .................. 120
Ming Zhang, Dong-qing Yang, Zhi-Hong Deng, Ying Feng, Wen-qing Wang, Pei-xiang Zhao, Sai Wu, Shu-an Wang, and Shi-Wei Tang

Learning by Seamless Migration – A Kind of Mobile Working Paradigm ...... 128
Degan Zhang, Yuanchun Shi, Enyi Chen, Guangyou Xu, and Hongliang Gu

XML-Based Agent Communication in a Distributed Learning Environment .... 136
Elvis Wai Chung Leung and Qing Li

Hook and Screen Division Based Screen Compression for the Real-Time Multimedia Transformation of e-Learning System .......... 147
Shengjun Li and Rui-min Shen

Design for a Learner-Oriented Tracking ............................................. 155
Lily Sun, Jude Lubega, and Shirley Williams

Web-Based Adaptive Collaborative Learning Environment Designing ......... 163
Yonggu Wang, Xiaojuan Li, and Rong Gu

A CATV and Internet Combined Framework for Distance Learning .......... 169
Zimin Mo, Wei Xing, and Dongming Lu

MPEG-4 Based Interactive 3D Visualization for Web-Based Learning ......... 176
Qiong Zhang and Jiaoying Shi

An Adaptive Distance Learning System Based on Media Streaming .......... 184
Hao Yin, Chuang Lin, Jin-Jun Zhuang, and Qiang Ni

Learning Resource Deployment, Organization and Management

CDAL: A Scalable Scheme for Digital Resource Reorganization .................. 193
Chong Chen, Hongfei Yan, and Xiaoming Li

An Approach to the Use and Automatic Generation of Web-Based Learning Materials ......................................................... 201
Victor Fresno-Fernández, Soto Montalvo-Herranz, Joaquin Pérez-Iglesias, Jaime Urquiza-Fuentes, and J. Ángel Velázquez-Iturbide
e-Learning Services Provision and Management ............................... 209
   Lily Sun, Yan Fu, Shirley Williams, and Tan Sun

A Modular Approach to e-Learning Content Creation and Maintenance ............ 217
   Phan Thanh Duc and Peter Haddawy

Using a Knowledge-Based Management
to Design a Web-Based Creative Problem Solving System .......................... 225
   Lin-Jung Wu and Hsien-Sheng Hsiao

Context-Based Classification for Link Data ............................................ 233
   Yonghong Tian, Wen Gao, and Tiejun Huang

Build Presentation Layer for Semantic Contents ....................................... 241
   Hang Guo, Zhiqiang Zhang, Qi Guo, Lizhu Zhou, and Jianghua Feng

e-Learning Content Management Based on Learning Object .......................... 249
   Rui-min Shen, Li-ping Shen, and Xin-wei Fan

Improving Web-Based Learning: Automatic Annotation
of Multimedia Semantics and Cross-Media Indexing ................................. 255
   Yueting Zhuang, Congmiao Wu, Fei Wu, and Xiang Liu

Practice and Experience Sharing

Multimedia Distance Learning Application on Embedded End Device ................. 263
   Xin Chen, Yongqin Zeng, and Ningjiang Chen

Web-Based Collaborative Learning System Design
for Navigation Education and Training .................................................... 271
   Cui Xie, Yicheng Jin, Xiwen Liu, and Yong Yin

Aphasics’ Communities Learning on the Web ........................................... 277
   Marc Spaniol, Ralf Klamma, Luise Springer, and Matthias Jarke

Crossing Boundaries with Web-Based Tools
for Learning Object Evaluation .............................................................. 286
   Jerry Zhigang Li, John C. Nesbit, and Griff Richards

Web-Based Handwriting Education with Animated Virtual Teacher .................... 293
   Howard Leung and Taku Komura

From e-Learning to Virtual Learning Community: Bridging the Gap ................. 301
   Naomi Augar, Ruth Raitman, and Wanlei Zhou

A Web-Based CAD System for Learning and Laboratory Purpose ...................... 309
   Ying Shan Tai and Wenyin Liu

A Web-Based Teacher Assisting Agent System ........................................... 317
   Jianhua Ma, Ryosuke Komatsu, and Runhe Huang
An Application-Oriented e-Learning System
with Self-monitoring and Adaptive Exercises ................................. 325
Joseph Fong, Irene Kwan, Margaret Ng, Ivan Li, and S.K. Chan

Methodologies of the Personalized Courseware Construction Tools
for e-Learning .................................................................................. 333
Yanhua Cao, Xiaoming Li, Huisheng Chi, and Xihong Wu

Agent-Based Web Learning System Applying Dynamic Fuzzy Petri Net ........ 338
Yueh-Min Huang, Juei-Nan Chen, Shu-Chen Cheng, and William C. Chu

Design and Implementation of Virtual Computer Network Lab
Based on NS2 In the Internet ......................................................... 346
Jianxin Wang, Bei Peng, and Weijia Jia

Semantics-Based Answers Selection in Question Answering System ............ 354
Xia Sun and Qinghua Zheng

e-Learning Standards

Learning Content Recommendation Service Based-On
Simple Sequencing Specification .................................................. 363
Li-ping Shen and Rui-min Shen

Learning Object Models and an e-Learning Service Infrastructure
for Virtual e-Learning Communities ............................................. 371
Gilliean Lee and Stanley Y.W. Su

Implementation Issues on the Quality Evaluation of Web-Based Courses
and Digital Learning Resources ...................................................... 379
Xia Teng, Brandon Muramatsu, JianWei Zhang, Joseph G. Tront, Flora McMartin, and Alice Agogino

Reusable Learning Object and Its Strategies for e-Learning .................... 386
Qingtang Liu, Zongkai Yang, Kun Yan, and Di Wu

An Implementation of Learning Objects Management System ................ 393
Wang Xuan, Zheng Li, and Yang Fang

Specification for Service Quality Management System of e-Learning .......... 400
Yi Zhang, Zhiting Zhu, Xiaoyong Hu, and Qing Li
## Pedagogical Issues

<table>
<thead>
<tr>
<th>Title</th>
<th>Pages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Personalized Education: An Exploratory Study of Learning Pedagogies in Relation to Personalization Technologies</td>
<td>407</td>
</tr>
<tr>
<td><em>Apple W.P. Fok and Horace H.S. Ip</em></td>
<td></td>
</tr>
<tr>
<td>Guidelines towards Effectively Sharable LOs</td>
<td>416</td>
</tr>
<tr>
<td><em>Emanuela Busetti, Giuliana Dettori, Paola Forcheri, and Maria Grazia Ierardi</em></td>
<td></td>
</tr>
<tr>
<td>Articulation of Learners Requirements for Personalised Instructional Design in e-Learning Services</td>
<td>424</td>
</tr>
<tr>
<td><em>Lily Sun, Khadidjatou Ousmanou, and Shirley Williams</em></td>
<td></td>
</tr>
<tr>
<td>Comparison of Pronunciation Scores in Spoken Language Learning System</td>
<td>432</td>
</tr>
<tr>
<td><em>Weiqian Liang, Jia Liu, and Runsheng Liu</em></td>
<td></td>
</tr>
<tr>
<td>Community Knowledge Building Environment with Concept of KBC</td>
<td>440</td>
</tr>
<tr>
<td><em>Xinyu Zhang, Nianlong Luo, XiangCun Wu, DongXing Jiang, JianWei Zhang, and DongXue Liu</em></td>
<td></td>
</tr>
<tr>
<td>Student Participation Index: Student Assessment in Online Courses</td>
<td>449</td>
</tr>
<tr>
<td><em>Alan Y.K. Chan, Paul Kai-on Chow, and K.S. Cheung</em></td>
<td></td>
</tr>
</tbody>
</table>

### Author Index

*Author Index* 457