TeE-LEARNING

The Challenge for the Third Millennium

IFIP - The International Federation for Information Processing

IFIP was founded in 1960 under the auspices of UNESCO, following the First World Computer Congress held in Paris the previous year. An umbrella organization for societies working in information processing, IFIP's aim is two-fold: to support information processing within its member countries and to encourage technology transfer to developing nations. As its mission statement clearly states,

IFIP's mission is to be the leading, truly international, apolitical organization which encourages and assists in the development, exploitation and application of information technology for the benefit of all people.

IFIP is a non-profitmaking organization, run almost solely by 2500 volunteers. It operates through a number of technical committees, which organize events and publications. IFIP's events range from an international congress to local seminars, but the most important are:

- The IFIP World Computer Congress, held every second year;
- open conferences;
- working conferences.

The flagship event is the IFIP World Computer Congress, at which both invited and contributed papers are presented. Contributed papers are rigorously refereed and the rejection rate is high.

As with the Congress, participation in the open conferences is open to all and papers may be invited or submitted. Again, submitted papers are stringently refereed.

The working conferences are structured differently. They are usually run by a working group and attendance is small and by invitation only. Their purpose is to create an atmosphere conducive to innovation and development. Refereeing is less rigorous and papers are subjected to extensive group discussion.

Publications arising from IFIP events vary. The papers presented at the IFIP World Computer Congress and at open conferences are published as conference proceedings, while the results of the working conferences are often published as collections of selected and edited papers.

Any national society whose primary activity is in information may apply to become a full member of IFIP, although full membership is restricted to one society per country. Full members are entitled to vote at the annual General Assembly, National societies preferring a less committed involvement may apply for associate or corresponding membership. Associate members enjoy the same benefits as full members, but without voting rights. Corresponding members are not represented in IFIP bodies. Affiliated membership is open to non-national societies, and individual and honorary membership schemes are also offered.

TeLE-LEARNING

The Challenge for the Third Millennium

*IFIP 17th World Computer Congress —
TC3 Stream on TelE-Learning
August 25-30, 2002, Montréal, Québec, Canada*

Edited by

Don Passey
*Lancaster University
United Kingdom*

Mike Kendall
*Northamptonshire County Council
United Kingdom*

SPRINGER SCIENCE+BUSINESS MEDIA, LLC

Library of Congress Cataloging-in-Publication Data

A C.I.P. Catalogue record for this book is available from the Library of Congress.

TelE-Learning: The Challenge for the Third Millennium

Edited by Don Passey and Mike Kendall

ISBN 978-1-4757-6695-0

ISBN 978-0-387-35615-0 (eBook)

DOI 10.1007/978-0-387-35615-0

Copyright © 2002 by IFIP International Federation for Information Processing

Originally published by Kluwer Academic Publishers in 2002

All rights reserved. No part of this work may be reproduced, stored in a retrieval system, or transmitted in any form or by any means, electronic, mechanical, photocopying, microfilming, recording, or otherwise, without written permission from the Publisher Springer Science+Business Media, LLC , with the exception of any material supplied specifically for the purpose of being entered and executed on a computer system, for exclusive use by the purchaser of the work.

Printed on acid-free paper.

*The original version of the book frontmatter was revised:
The copyright line was incorrect. The Erratum
to the book frontmatter is available at
DOI: [10.1007/978-0-387-35615-0_52](https://doi.org/10.1007/978-0-387-35615-0_52)*

Contents

IFIP and TC3	xiii
Foreword	xv
Stream 3 International Programme Committee	xix
The Challenge for the Third Millenium	xxi
Teacher education (TED) track - Invited Paper	
Design of teacher e-learning: The scenario model BENT B. ANDRESEN	3
Teacher education (TED) track - Papers	
Developing technology competencies among Egyptian college of education students MAGDY M. ALY	13
Co-operative parent-child learning: In computerised technological environments UZI ARMON	21
ICT-supported teaching and learning: Some priorities and objectives for the future ROSA M. BOTTINO	29

Learning aids and learners' activities in the field of object-oriented modelling TORSTEN BRINDA AND SIGRID E. SCHUBERT	37
Experiment around a training engine ANNE BRYGOO, TITOU DURAND, PASCALE MANOURY, CHRISTIAN QUEINNEC AND MICHÈLE SORIA	45
Collaborative learning of mathematics: Problem-solving and problem-posing supported by 'Knowledge Forum' ERIK DE CORTE, LIEVEN VERSCHAFFEL, JOOST LOWYCK, STIJN DHERT, AND LUC VANDEPUT	53
Teaching historical truth: Pages from the history of Russian computer science YAKOV I. FET	61
Creating technology mentor teachers through a digital sabbatical opportunity on-line CATHERINE P. FULFORD, RACHEL A. RIVERS, GARY THEAL AND CELIA MAIN-ANAKALEA	69
Pedagogical ICT licences: A Danish national initiative to offer teachers technology literacy ULLA GJØRLING	77
Electronic testing system BOYKA GRADINAROVA AND OGNJAN JELEZOV	85
Banjós on the Snowy: Implementing e-Activism in education LEISSA KELLY AND PAUL NICHOLSON	93
Streaming technology - How does it affect education? Report from a project using satellite-based communication ANTON KNIERZINGER, CAROLINE WEIGNER AND BERNHARD COLLINI-NOCKER	97
National strategy for teacher training in new ICT use: The Ukrainian case VALENTINA KOLOS	101

e-learning Portal@Austria: The innovative platform for education, science and culture in the Knowledge Society ROBERT KRISTÖFL	105
ULEARN: A project for building a European community of pioneer teachers VITTORIO MIDORO, STEFANIA BOCCONI AND FRANCESCA POZZI	109
City-to-Surf - A peer-to-peer model of on-line professional development: A collaborative mentoring model PAUL NICHOLSON AND PETER DE WACHT	113
The challenge of the information society for South African teachers JYRKI PULKKINEN AND TRUDI VAN WYK	121
A computerised examination system TEEMUPEKKA VIRTANEN, RONJA ADDAMS-MORING, SANNA LIIMATAINEN AND LINDA STAFFANS	125
Life-long learning - Professional development (LL-PD) track - Invited Paper	
Life-long learning in virtual learning organisations: Designing virtual learning environments TOM J. VAN WEERT	135
Life-long learning - Professional development (LL-PD) track - Papers	
Using case studies to promote life-long learning ROBERT M. AIKEN, CHERYL SANDAS, NED KOCK AND MUNIR MANDVIWALLA	145
Virtual Institute for the Modelling of Industrial Manufacturing Systems: Integration of on-line and 'face-to-face' learning in an international platform for teaching and research SERGIO CAVALIERI, MARCO GARETTI, MARCO MACCHI, ALESSANDRO CAMPI, FRANCESCA COLLINA, ALBERTO COLORNI, IGNAZIO LOCATELLI, TIZIANA LONGERI, GREGOR VON CIEMINSKI, JENS LOPITZSCH, MARIA DI MASCOLO, YANNICK FREIN, BOTOND KADAR, LASZLO MONOSTORI, ELISABETA ILIE ZUDOR, ALBERTO MERONI, AND NICOLETTA SANTAMBROGIO	153

Quality of working life, knowledge-intensive work processes and creative learning organisations: Information processing paradigm versus self-organisation theory KLAUS FUCHS-KITTOWSKI AND FRANK FUCHS-KITTOWSKI	161
Public and private partnerships for intense e-Business training THOMAS GULLEDGE AND JENNIFER SHERWIN	169
Adaptive context-aware learning environments: Live spaces as a basis for life-long learning in computer science GERALD QUIRCHMAYR AND JILL SLAY	177
Learning environments and responsibility: Three types of learning environments MARIJKE HEZEMANS AND MAGDA RITZEN	185
Issues in the organisational and change context for innovations using ICT in higher education MURRAY SAUNDERS, JOËL BONAMY AND BERNADETTE CHARLIER	193
Cultural differences of female enrolment in tertiary education in computer science BRITTA SCHINZEL	201
Towards a cyclical model of distance education PETER SERDIUKOV AND STEVE WHEELER	209
A qualitative study of change and reform through professional development and innovation diffusion: One university's experience MICHAEL SZABO, DAYLENE J. LAUMAN AND SONIA A.C.K. SOBON	217
Understanding the process of information systems and ICT curriculum development: Three models ARTHUR TATNALL AND BILL DAVEY	225
Issues of decentralisation and central control in educational management: The enabling and shaping role of technology ARTHUR TATNALL AND ALLAN PITMAN	233

Informal learning communities in the knowledge economy: Informal knowledge development in the multimedia sector DIANE-GABRIELLE TREMBLAY	241
Learning technologies (LT) track - Invited Paper	
Modelling and delivering distributed learning environments GILBERT PAQUETTE	251
Learning technologies (LT) track - Papers	
A distributed and co-operative environment to help the rehabilitation of children with Down's syndrome ANA MARGARIDA P. ALMEIDA AND FERNANDO M. S. RAMOS	261
Information systems and educational engineering: Bridging two concepts through meta modelling MARIE-NOËLLE BESSAGNET, CHRISTOPHE MARQUESUZAÀ, THIERRY NODENOT, CHRISTIAN SALLABERRY AND PIERRE LAFORCADE	269
Emerging base for telE-learning in India RAKESH M. BHATT AND KRISHNAMURTHY SUBRAMANIAN	277
Web-adaptive training system based on cognitive student style MARIA A. M. SOUTO, MARIANO NICOLAO, ROSA M. VICCARI, JOSÉ P. M. DE OLIVEIRA, REGINA VERDIN, KARINE BESCHOREN, MILTON MADEIRA, AND RENATA ZANELLA	281
A methodological and physical instrumentation to support experimentation in telE-learning AUDE DUFRESNE, FRANCE HENRI AND RICHARD HOTTE	289
How to change the unchanging? Restructuring Polish universities for the XXI century R. ROBERT GAJEWSKI	297
The long-term trends in changing educational organisation in the Ukraine SVETLANA KUDRJAVTSEVA	301
Distributed learning and management system for university courses SANNA LIIMATAINEN AND TEEMUPEKKA VIRTANEN	305

An editing tool based on cognitivism theory to support distance learning RAFAEL G. ORBOLATO, VÂNIA P. DE ALMEIDA, JÚNIA C. A. SILVA	309
Learning high level programming in a virtual laboratory using the SimulNet educational platform PEDRO RODRÍGUEZ, ALFONSO FERNÁNDEZ, LUIS ANIDO, JUAN SANTOS, JUDITH RODRÍGUEZ AND MANUEL CAEIRO	313
Standardisation in tele-learning: A critical analysis JUAN SANTOS, MANUEL CAEIRO, JUDITH RODRÍGUEZ AND LUIS ANIDO	321
e-PhD: A new approach for post-graduate studies in developing countries M. TAREK SHALABY, ASHLEY TUCKER AND BENG YONG TANG	329
Educational partnerships on-line: Global collaborative learning through an on-line student exchange programme ELIZABETH STACEY AND FAYE WIESENBERG	337
LearnNet: VSAT-based interactive distance learning network to upgrade distance education in India MATHURA P. THAPLIYAL AND MANMOHON M.S. RAUTHAN	345
Using multiple perspectives to interpret empirical results: Does it add value to the interpretation? ISABELLA VENTER AND J. DEWALD ROODE	349
Usability evaluation of web-based learning: An essential ingredient for success JANET WESSON	357
Gold Peach 1996-2001: Series research on developing a learning web community TUNG-XIUNG WU	365
Erratum to: TelE-Learning DON PASSEY AND MIKE KENDALL	E1
Author index	369
Key word index	371

IFIP and TC3

IFIP – International Federation for Information Processing

IFIP is a non-governmental, non-profit umbrella organisation for national societies working in the field of information processing. It was established in 1960 under the auspices of UNESCO as an aftermath of the first World Computer Congress held in Paris in 1959. Today, IFIP has several types of members and maintains friendly connections to specialised agencies of the UN system and non-governmental organisations. Technical work, which is the heart of IFIP's activity, is managed by a series of Technical Committees (TCs).

IFIP's mission is to be the leading, truly international, apolitical organisation which encourages and assists in the development, exploitation and application of information technology (IT) for the benefit of all people.

Like the other eleven Technical Committees of IFIP, TC3 consists of one representative from each of the IFIP members plus the current chairs of its seven working groups. It normally meets once each year and past meetings have been hosted by Germany, Switzerland, the United Kingdom, Australia, Zimbabwe, Austria, the USA, Denmark and France. Future meetings include Finland in 2003, and South Africa in 2004.

The area of concern to TC3 is education, and its aims are:

1. To provide an international forum for educators to discuss research and practice in:
 - a. teaching informatics.
 - b. educational uses of information and communication technologies (ICT).
2. To establish models for informatics curricula, training programmes and teaching methodologies.
3. To consider the relationship of informatics in other curriculum areas.
4. To promote the ongoing education of ICT professionals and those in the workforce whose employment involves the use of information and communication technologies.

5. To examine the impact of information and communication technologies on the whole educational environment, including aspects of:
- teaching and learning.
 - administration and management of the educational enterprise.
 - local, national and regional policy making and collaboration.

The seven Working Groups (WGs) of TC 3 are:

- WG 3.1 Informatics and ICT in Secondary Education
- WG 3.2 Informatics and ICT in Higher Education
- WG 3.3 Research on Education Applications of Information Technologies
- WG 3.4 IT-Professional and Vocational Education in Information Technology
- WG 3.5 Informatics in Elementary Education
- WG 3.6 Distance Learning
- WG 3.7 Information Technology in Educational Management

Further information about the IFIP TCs and WGs is available on the IFIP homepage (www.ifip.or.at), where you can find links to member societies and to the Working Groups of IFIP. You may also contact the IFIP Secretariat directly.

IFIP Secretariat,
Hofstraße 3,
A-2361 Laxenburg, Austria
Tel.: +43 2236 73616,
Fax: +43 2236 73616 9,
e-mail: ifip@ifip.or.at

Foreword

The seventeenth IFIP World Computer Congress was held between August 25 – 30, 2002, in the Palais des Congrès de Montréal, Canada. The theme of the congress was 'Information Technology - the Need for Convergence between Industry, Practitioners and Researchers'.

One of the goals of the International Federation for Information Processing (IFIP) is to strengthen relationships between researchers and industry representatives in the vast field of information technology. Accordingly, the International Programme Committee (IPC) for IFIP 2002 created a special industry stream to focus on practical needs in this area.

At the Montréal conference, papers were presented in streams of interest to experienced professionals and practitioners, as well as those who were new to information and communication technologies.

Paper submissions on a range of conference topics made clear the novel aspects of the work they presented, and described their contribution to the development of information technology for technical or business issues.

The Montréal Conference in 2002 provided an opportunity for researchers, professionals and information technology experts, educators, policy makers, vendors and manufacturers and learners, to share actions, both those in the present and those planned. It was a conference for everyone involved in information technology who wished to improve their knowledge and skills by bringing together researchers and practitioners to discuss the state of the art, to raise questions, to state problems, and to identify concerns for further action.

Authors presented papers on current research in organisations and enterprise, case studies on using new technologies, experiments with methods and procedures in industry and practice, successes and failures of

approaches and technology, state of the art technology and trends, changing role of research in industry, linking research and industry, and industry research networks, developments of practical relevance for practitioners and industry.

This current volume offers the papers presented within Stream 3, 'Tele-Learning'. The Tele-Learning stream of the World Computer Congress provided an opportunity to describe and demonstrate developments, to discuss and evaluate the achievements to date, in three separate tracks.

Teacher Education (TED) Track

Teacher education is key to integrating ICT in schools. Under the umbrella theme, 'Information Technology for our Times: Ideas, Research and Application in an Inclusive World', this track addresses different facets of ICT and teacher education, including: modern technical infrastructures, curricula and national strategies, and innovative pedagogical methods, such as flexible and distance learning, that are changing the role of teachers.

Life-long Learning – Professional Development (LL-PD) Track

Learning is customarily associated with institutions - physical locations attended to achieve certain goals at different points in our lives. ICT is radically changing these notions by providing opportunities for growth and development to new, self-sustaining communities that only exist on and through the internet. Large and small, formal and informal, these new learning communities are being established alongside and in competition with existing institutions. This track described and demonstrated how ICT is enabling new distributed learning communities to meet learners' needs, especially those who would not, or could not benefit from school, college, university or work-based training. The web offers countless possibilities to the virtual community, by for example, introducing new learning styles to disaffected communities; mitigating the effects of diaspora; using broadband communications to distribute high-quality learning opportunities; and supporting peer and intergenerational learning. Free from the constraints of traditional educational structures, virtual learning communities can serve the needs of their members in an effective and flexible manner.

Learning Technologies (LT) Track

Working and learning are increasingly coming together. More and more knowledge-based, businesses and industry are being transformed into 'learning organisations' where workers continually update their skills, learning 'just-in-time' to tackle new problems that arise. In higher education, the full-time student is disappearing: today's students have jobs and are seeking to combine their studies with their work. The general consensus

appears to be that acquired knowledge should be applied now, not later, which means there is no work without learning and no learning without work. Lifelong learning is emerging as the new learning tool of the future, both in and outside of academic institutions. It is a flexible, demand-driven learning network, supported by ICT in which teachers, experts and working students participate on an equal level.

Stream 3 International Programme Committee

Chair:

Raymond Morel

Switzerland

Co-chairs:

Anton Knierzinger

Austria (TED track)

Mike Kendall

UK (LT track)

Tom van Weert

The Netherlands (LL-PD track)

Other Members:

Rosa Maria Bottino

Italy

Bernard Cornu

France

Carolyn Dowling

Australia

Alex Fung

Canada

Paul Nicholson

Australia

Hajime Ohiwa

Japan

Edward A. Parrish

USA.

Don Passey

UK

Fernando Ramos

Portugal

Mikko Ruohonen

Finland

Brian Samways

UK

Elizabeth Stacey

Australia

Joe Turner

USA.

Raul Sidnei Wazlawick

Brazil

Jan Wibe

Norway

Lung-Hsiang Wong

Singapore

The Challenge for the Third Millennium

Don Passey and Mike Kendall

Lancaster University, UK and Northamptonshire County Council, UK

Editors

Contributions to the Stream 3 conference were considered through three tracks:

Teacher education (TED).

Life-long Learning – Professional Development (LL-PD).

Learning Technologies (LT).

The papers contributed to a wide-ranging view of a number of discernible themes within these tracks. The themes were constituted as sessions within the conference. Brief descriptions of each paper, in each of these sessions, are given below. Within the main volume, papers in the three tracks are presented separately, with the invited paper in each strand presented initially, followed by all other papers in each track alphabetical order of the first author.

Within **Teacher Education (TED)** there were seven sessions.

Teacher Training Projects

Fulford, Rivers and Theal (page 69) describe the factors which were considered in developing a successful in-service teacher development programme to fulfil the needs for technology proficient teachers. Nicholson

and deWacht (page 113) describe the development, use and success outcomes of a peer-to-peer system to support teacher professional development and practice. Gjølring (page 77) describes how a pedagogical ICT license has been developed and deployed to support teacher development for nearly a third of practicing teachers in Denmark.

Crossing borders

Andresen (the invited speaker for the track, page 3) discusses the principles used to create a successful e-Learning professional development programme in Denmark. Armon (page 21) describes the creation of situations to involve parents more with pupils in learning, and offers some outcomes to date.

Poster session

Knierzinger, Weigner and Collini-Nocker (page 97) describe how satellite-based communication is being used to provide interactive TV as a part of an e-Learning environment for students in schools. Kelly and Nicholson (page 93) describe how ICT was used to achieve e-Activism, and pedagogical features for considering environmental and political goals. Kristöfl (page 105) describes the development of an e-learning portal to initiate and handle the range of initiatives and projects for future topics in education, science and culture.

National Policies

Pulkkinen and van Wyk (page 121) offer an analysis of the changes and challenges that face the education system in South Africa, and how a cross-national collaboration is addressing the needs identified. Kolos (page 101) describes the background to teacher training in ICT use in the Ukraine, and some implications for future national policy directions. Aly (page 13) describes the development and outcomes of approaches to integrating ICT into a range of professional education programmes in colleges of education in Egypt.

Teacher Training Projects

Bottino (page 29) explores European processes that focus on developing research in the multimedia area, and offers some crucial future issues that need to be considered. Brygoo, Durand, Manourcy, Queinnec and Soria (page 45) describe the use of a computerised training engine as an element within an introductory course for students in computer science. Midoro, Bocconi and Pozzi (page 109) describe the features that underpin the development of a community of 'pioneer teachers' across a range of countries in Europe.

Testing Tools

Virtanen, Addams-Moring, Liimatainen and Staffans (page 125) describe the integration, use and outcomes of a computerised examination system in a university course. Gradinarova and Jelezov (page 85) describe how an

electronic testing system has been developed, which addresses a range of recognised issues with the use of such systems.

Modelling

Brinda and Schubert (page 37) describe how ‘exploration modules’ have been successfully introduced into informatics education in a university course as an aid to learning object-oriented modelling. De Corte, Virschaffel, Lowyck, Dhert and Vandeput (page 53) present the results of a study which looked at the impact of a computer-supported collaborative learning environment on upper primary school pupils’ problem-solving competencies. Fet (page 61) describes the current situation with the reporting of the history of computing in central and eastern Europe, and its importance in the context of the world history of the subject.

Within Life-long Learning – Professional Development (LL-PD) there were five sessions.

Creative Learning Organisations

Van Weert (the invited speaker for this track, page 135) discusses the factors which lead to successful virtual learning organisations being established, and the experiences in a national development of this type. Tatnall and Davey (page 225) offer alternative models to consider when introducing aspects of curriculum development into university IS and ICT courses. Cavalieri, Garetti et al. (page 153) describe how a research project is establishing a virtual institute to support traditional institutions in the area of modelling of industrial manufacturing systems.

Learning Environments

Aiken, Sandas, Knock and Mandiwalla (page 145) describe how case studies were used as a central approach within an information technology course, and their impact upon teachers and students. Hezemans and Ritzen (page 185) present an analysis of differences in learning environments being established in HE institutions, and their implications. Quirchmayr and Slay (page 177) argue that current tools do not meet the demand for just-in-time and life-long learning computer science needs, and offer alternative tools that provide for high levels of integration and context-awareness.

Knowledge Management and e-Ness

Tremblay (page 241) discusses how modes and forms of knowledge are developed by workers in the multimedia sector, and their need to take new approaches at this time. Gullledge and Sherwin (page 169) describe the approach taken in an industrial co-operation project to enhance executive-level technology transfer.

Change and Reform

Szabo, Lauman and Sobon (page 217) offer the results of a qualitative study into the process of change and reform through a professional

development model grounded in a specific theory applied to instructional technology in a research university. Serdiukov and Wheeler (page 209) argue that factors are currently moving developments in particular ways, and that current reasons given for these developments may not prove to be borne out in practice. Saunders, Bonamy and Charlier (page 193) present an analysis of the change processes that can occur when ICT was introduced into 20 HE institutions across Europe.

Human Choice

Fuchs-Kittowski and Fuchs-Kittowski (page 161) argue that knowledge-intensive work processes require a greater emphasis on the concept of self-organisation since information is itself generated during this latter process. Tatnall and Pitman (page 233) discuss the role of ICT when educational management is decentralised (and its fundamental potential role in central control). Schinzel (page 201) explores how women's enrolment in computing courses has changed in some countries, and the reasons and explanations that may give ways of approaching enrolment in the future.

Within **Learning Technologies (LT)** there were six sessions.

Developing TelE-Learning Environments

Paquette (the invited speaker for this track, page 251) describes how a delivery model in the context of flexible life-long learning and distributed systems for professional development can address the problems of technical and organisational noise. Shalaby, Tucker and Tang (page 329) describe how an e-PhD was established, and the features of its success. Souto, Verdin, Beschoren, Zanella, Nicolao, Madeira, Viccari and de Oliveira (page 281) describe how cognitive learning styles of students were identified, and then used to focus web-adaptive content for students.

Developing Tools for TelE-Learning

Santos, Caeiro, Rodriguez and Anido (page 321) present a review of current progress with standardisation across institutions concerned with tele-Learning. Rodriguez et al. (page 313) describe how programming facilities of an integrated development environment have been provided in a virtual laboratory so that communication with, collaboration between and supervision of students is possible. Dufresne, Henri and Hotte (page 289) discuss the needs of a research and development methodology that is action-oriented if there are to be improvements in Tele-Learning environments and software artefacts.

TelE-Learning as a Strategy for Change

Kudrjavitseva (page 301) describes the national developments of ICT in the Ukraine, as well as trends and future implications. Gajewski (page 297) considers the needs and implications for higher education and for training that advances in ICT bring to universities in Poland. Bhatt and Subramanian

(page 277) describe the progress of Tele-learning in India, and the potential that the approach offers to the country. Thapliyal and Rauthan (page 345) describe how distance education offers particular potential for rural areas in India.

Developing Collaboration in Tele-Learning

Venter and Roode (page 349) describe how the use of a sequence of interpretative perspectives can lead to a richer outcome in terms of the evaluation of empirical practice. Almeida and Ramos (page 261) offer findings of the impacts of a distributed learning environment on rehabilitation of children with Down's syndrome. Stacey and Wiesenbergs (page 337) describe how an on-line student exchange programme was developed and used in two universities in different continents.

Achieving usability for Tele-Learners

Wesson (page 357) argues that usability of web-based learning material will be a critical future factor, and describes how standard usability evaluation methods could be used to address this need. Bessagnet et al. (page 269) describe how a learning environment has been specified to implement co-operative learning situations between teacher and students.

Tele-Learning Systems for Teachers

Liimateinen and Virtanen (page 305) describe how a distributed learning and management system was used to support the needs of increasing numbers of students in a university computer studies course. Orbolato, de Almeida and Silva (page 309) describe the development of a computer-based tool that offers cognitive strategies to promote active learning, which can be used in a distance learning context. Wu (page 365) describes how a learning-web community was developed, but that the results of its use suggest that cultural behaviours play a significant role in terms of outcomes.

We, the editors, have great pleasure in presenting this wide-ranging contribution. Our task has been to put together the work of each author(s), and to try to faithfully represent their endeavours within the constraints of this volume. If any errors have arisen then this should be recognised as our failing.

We would like to acknowledge the enormous contribution of Shealagh Whytock, Department of Educational Research, Lancaster University, UK, without the background secretarial and administrative support this volume would not have been produced.