e-Learning

CONCEPTS AND PRACTICE

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SAGE Publications
London ● Thousand Oaks ● New Delhi

First published 2006

SAGE Publications Ltd
1 Oliver's Yard
55 City Road
London EC1Y 1SP

SAGE Publications Inc.
2455 Teller Road
Thousand Oaks, California 91320

SAGE Publications India Pvt Ltd
B-42, Panchsheel Enclave
Post Box 4109
New Delhi 110 017

British Library Cataloguing in Publication data

A catalogue record for this book is available
from the British Library

ISBN-10 1-4129-1110-9 ISBN-13 978-1-4129-1110-8
ISBN-10 1-4129-1111-7 ISBN-13 978-1-4129-1111-5 (pbk)

Library of Congress Control Number: 2005938636

Typeset by C&M Digitals (P) Ltd, Chennai, India
Printed and bound in Great Britain by TJ International, Padstow
Printed on paper from sustainable resources

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John is a professor in Education in the School of Education at Queen's University, Belfast. His main research areas include policy and practice in information technology and assessment in education. Since 1990, he has been principal investigator in over 20 large and small-scale projects involving over £1.6 million including research on student workstation usage in a university setting, using portable computers in school classrooms, virtual learning environments for schools and teachers' use of computers. His most recent project examined the feasibility of an electronic repository for education-related research reports and policy documents in Northern Ireland.

Preface

e-Learning Concepts and Practice is a book for anyone wishing to find out about e-Learning, or indeed find out where e-Learning is headed! We offer tutors and students alike the opportunity to develop their knowledge and understanding of e-Learning through a variety of Internet sources and related practical activities. Whether you are a tutor or student in a college, university or training organization, the structure of the book will take you through key aspects of e-Learning; from definition and design, to its applications and its future. Blogs, wikis and MOOs are explained and illustrated and we introduce and explain the new concepts of 'communal constructivism' and the 'Communal Yottaspace'.

We have carefully checked all the URLs and the websites we mention in the book, just before going to press, but the Internet as you may know is in a state of constant growth and change. If you cannot find a particular site then think about the key concepts that we are using to illustrate it and search for similar examples. In the same way, if you come across a word, phrase or concept that you do not understand, we encourage you to practise the skills we highlight in the text. We want you to e-Learn!

There are substantial dictionary and encyclopedia resources on the Web – some with free access, some with subscription access – and they are all easily accessed through any browser such as Internet Explorer or Firefox, or through any search engine such as Google or Yahoo! Search. One excellent source is Wikipedia – a free, communally constructed encyclopedia where anyone can create or contribute to a definition. On the basis that large numbers of people monitor and contribute to these definitions, the likelihood is that any errors will be ironed out. So if you have a query, we

hope you will turn to the Web to answer it – but be careful, of course, some sources are much more reliable than others!

This book promotes communal constructivism, a concept of learning that has emerged as a strength of e-Learning. In communally constructed learning environments, each member of the community learns with and from others, and contributes learning resources for others. As a final word, therefore, we would be very remiss if we did not record our appreciation of the various colleagues and students in Inishnet, in Trinity College (Dublin), in Queen's (Belfast) and in Concordia (Montreal) with whom we have worked as part of our own community of learners in e-Learning.

Bryn Holmes and John Gardner
May 2006

List of Abbreviations

3D	three-dimensional
ABA	applied behaviour analysis
ACE	Accessible Communities for E-Business
ADA	Americans with Disabilities Act
ARPANET	Advanced Research Projects Agency Network
ASR	automatic speech recognition
BECTa	British Educational Communications and Technology Agency
BeST	electronic Basic Surgical Training
BETT	British Education Training and Technology
blog	weblog
CEN	European Standardization Committee
CENELEC	European Electrotechnical Standardization Committee
CERN	European Laboratory for Particle Physics
COL	Commonwealth of Learning
CoSE	Creation of Study Environments
CSS	cascading style sheet
D&P	drill and practice
EC	European Commission
ECDL	European Computer Driving Licence
ECDLPD	European Computer Driving Licence for People with Disabilities
EOE	Education Object Economy

ERIC	Education Resources Information Centre
ESO	European Standardization Organization
ETSI	European Telecommunications Standards Institute
EU	European Union
GIS	geographic information system
HCI	human–computer interface
HTML	HyperText Mark-up Language
HTTP	HyperText Transfer Protocol
H-NET	Humanities and Social Sciences Online
ICT	information and communication technology
IDeA	Improvement and Development Agency
IEEE	Institute of Electrical and Electronic Engineers
IEP	Individualized Education Program
IM	instant messaging
ITS	intelligent tutoring system
IVR	interactive voice response
LAN	local area network
LCSI	Logo Computer Systens Inc.
LIP	Learner Information Profile
LMS	learning management system
LSI	learning style inventory
MEP	Microelectronics Education Programme
MERLOT	Multimedia Educational Resource for Learning and Online Teaching
MLE	managed learning environment
MOO	multi-user dungeon object-oriented
MUD	multi-user dungeon
MuGame	multi-user variants of games
MuSim	multi-user variants of simulations
NASA	National Aeronautics and Space Administration
NCBI	National Council for the Blind in Ireland
NCET	National Council for Educational Technology
NDPCAL	National Development Programme for Computer Based Learning
N-I Tut	non-interactive tutorial
OU	Open University

PARC	Palo Alto Research Center
PBL	problem-based learning
PDA	personal digital assistant
PRISM	Publishing Requirements for Industry Standard Metadata
SAVI	Social Assistance for/with the Visually Impaired
SCORM	Sharable Content Object Reference Model
SCRAN	Scottish Cultural Resources across the Network
SI	System Internationale
TILE	The Inclusive Learning Exchange
TTS	text-to-speech synthesis
ULLeap	UL Lifelong Learner Information Profile
URL	universal resource locator
VICS	Visually-Impaired Computer Society of Ireland
VISUAL	Voice for Information Society Universal Access and Learning
VLE	virtual learning environment
VOIP	voice over Internet protocol
VXML	Voice eXtensible Mark-up Language
WAI	Web Accessibility Initiative
Web	World Wide Web
WIFI	Wireless Fidelity
WITSA	World Information Technology and Services Alliance
WYSIWYG	what you see is what you get
ZPD	zone of proximal development

1 Introduction

MISSION CRITICAL

e-Learning is unquestionably the major 'mission critical' in education systems the world over, and is likely to remain so for the foreseeable future. There are many reasons for it being so much in vogue, not least the globalization of commerce and citizenship, and the burgeoning of information and knowledge available on the Internet. The recognition that today's economies need to be knowledge based, which in turn require a workforce and consumer body that are characterized by flexibility, independence in learning and information and communications technologies competence, may be an even more compelling reason for governments to be as proactive as they are. As a means to increase access to learning – anytime and anywhere – the ensuing interest in e-Learning is nothing short of phenomenal, with the result that authoritative texts are in growing demand. No one could claim to offer a text that would be definitive in such a fast-moving environment but we offer *e-Learning: Concepts and Practice* as an all-round but sophisticated entrée to the power and potential of e-Learning, and the main approaches to delivering it. We draw on a wide variety of globally dispersed examples and, in order to help understand why it is in the form we currently know it, we also provide a potted history to chart e-Learning's evolution from its antecedents in programmed learning. The text should therefore prove of interest to the general reader and to students, academics and professionals working in the field of educational computing.

The twin goals of the book are to provide an overview of existing e-Learning approaches and a vision of the future. We specifically look at

ways that e-Learning will optimize teaching and learning for academic researchers, trainers and educators, World Wide Web (Web) developers, resource content managers and those who have a general interest in e-Learning. The intention is to enhance understanding of the potential of e-Learning by covering all its important aspects in ways that explore, through practical examples, the implications of its use. The insights gained will act as a foundation for further exploration.

Each of the nine chapters explores a different feature associated with e-Learning, from learning enrichment to lifelong learning. The sequence of chapters is laid out in a manner that takes the reader from the more simple concepts of how to provide enrichment in the learning process to the more complex issues involved in building a community of learners. Promoting the knowledge these learners develop in turn creates a self-sustaining learning community.

A FRAMEWORK OF PRACTICE

Traditional books are arguably not an adequate vehicle for dealing with e-Learning in that the printed page has considerable limitations when it comes to illustrating its interactional features and power. The design of *e-Learning: Concepts and Practice* therefore allows for the main text of each chapter to address the concepts involved, while a variety of 'break-out boxes' provides readers with opportunities to look more practically at aspects of e-Learning through carefully chosen websites and online activities.

e-Learning requires different types of engagement, categorized in the framework of key practices or skills illustrated in the petals of the e-learning 'flower' in Figure 1.1. Note that the radial nature of the flower petals imply that there is no hierarchy in this framework. In any one instance, the practical activity undertaken by the learner may involve only one or perhaps several of the actions or skills denoted in the figure. While it might be possible to suggest levels of complexity to associate with the elements of this framework, it is likely that such a consideration will be irrelevant. It will be the actual context and the learner's needs and aspirations that will determine which practice or skill is appropriate.

A brief outline of these key practices is provided below.

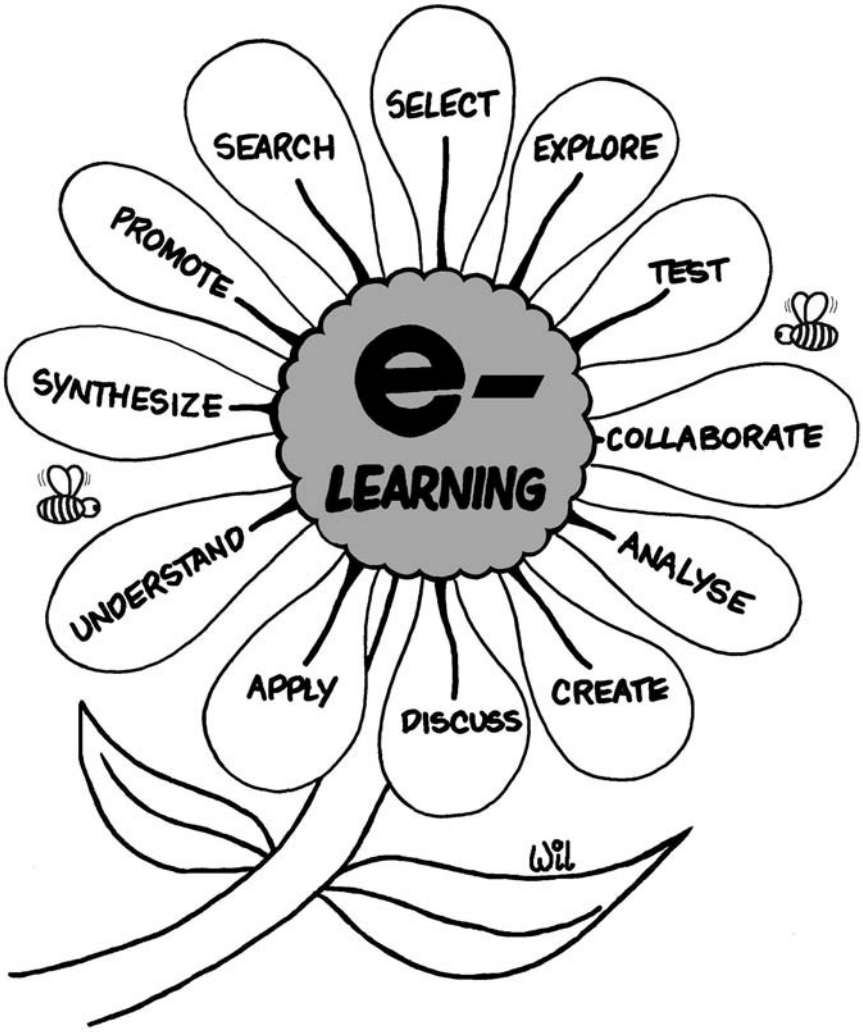

Figure 1.1 A flower petal framework (non-hierachical) for e-Learning practices and skills

Searching and selecting

Usually in some combination, search and select activities are the 'bread and butter' of learners' collation of information; the one identifying where the sources of information might be (searching), the other choosing the most relevant sources according to the criteria established by their learning

needs (selection). For example, the reader in Box 1.1 is asked to go the Massachusetts Institute of Technology's OpenCourseware site to search out and select specific academic materials from a wide range of resources for different subject areas. The final selection is made on the basis of the value of the courseware for their own purposes.

Box 1.1

Visit the Massachusetts Institute of Technology's OpenCourseware site at http://ocw.mit.edu/index.html and search for information on the poet John Donne. Select anything that would help you to develop your knowledge of the nature of English poetry in the sixteenth and seventeenth centuries. Do not worry if you have no interest in poetry – just try the exercise for fun.

Saving and keeping track of the information, and any new knowledge, are skills that will be challenged persistently by the sheer volume of material available. Bookmarking or saving favourite websites will make it easier to conduct subsequent searches, but personal annotated databases will be increasingly needed to hold all relevant electronic sources. There was a time when each family was lucky to have a few texts or perhaps only a Bible; today in the developed world we are literally drowning in information! The skills of criterion-searching and selecting by relevance are staples in the set of basic Internet literacy tools.

Exploring

Similar to searching, exploring implies a more relaxed browsing, looking for information that might match our interests or meet our needs. It is an almost everyday activity, as we scan a magazine or newspaper, for example, for items that interest us. As with searching, it is based on a set of criteria but more loosely than the specific search criterion ('information on John Donne') illustrated in Box 1.1.

Testing

Related to exploring is the discovery mode of e-Learning, in which learners try out ideas, test hypotheses, and so on. Web-based information comes in many forms and simulations, and games are examples in which the full potential of interactive engagement is used. Rather than simply reading new information, such activities enable the learner to avail him or herself of a type of information-cum-knowledge creation that requires them to explore and manipulate virtual circumstances and conditions relevant to the focus of their studies. For example, students of chemistry may test models of complex molecules or they may conduct virtual experiments. Social science students may model voting patterns or the factors affecting levels of poverty in specific regions. All such work proceeds in an e-Learning context without the burdens of expensive resources, real-time practicalities and, even, dangers that the real conditions might impose. The very act of 'doing' the work allows the learner to create and assimilate new knowledge. Have a go at Box 1.2!

Box 1.2

Visit http://www.colorado.edu/physics/phet/simulations-base.html, which is a physics education site hosted by the University of Colorado. Use the Sound simulation to explore and test how sound is heard by a listener when the source experiences air pressure changes.

Analyse and synthesize

These activities often go together as learners deconstruct the complexity of a set of information (analyse) and rebuild it as their own knowledge (synthesize). When we analyse a set of information, be it train timetables or quotations for holiday insurance for example, we attempt to reduce it to different categories, distinguished by the importance we attach to each of them. Once we have looked at several versions of the information, the risks covered by each of several insurance policy proposals for example, we

begin to synthesize it to make sure that what we eventually choose fits our needs and at a competitive cost within the options we have. Learning is no different. Whatever the context, the analysis of relevant information from different case studies, examples of scientific phenomena, periods of architecture or whatever, and the synthesis or pulling together of this information to suit our specific learning needs, are key learning skills necessary not only for constructing the new knowledge for ourselves, but for beginning to contribute new understandings for others. Have a look at the exercise in Box 1.3 – but do not worry, it is only an example and we do not expect you to complete the exercise!

Box 1.3

Check out the website of the Early Childhood Research and Practice online journal at http://ecrp.uiuc.edu/, and search through to find the following papers:

- The Llama Project (Ganzel and Stuglik, vol. 5, no. 2);
- The Lunch Project (Floerchinger, vol. 7, no. 1);
- The Construction Project (Berry and Allen, vol. 4, no. 1).

What are the common features of these project reports (Analyse) and what implications do they have for developing good practice in early years education (Synthesize)?

While the first six learning practices above assist learners to assimilate 'new knowledge and understanding', the next six exhort them to follow through, consolidate, share and use their knowledge gains.

Collaborate and discuss

The cycle might begin with the learners seeking to share the information and new knowledge with others (collaboration and discussion); a process that is well known to consolidate and improve understanding through the action of being obliged to explain (externalize) what has begun to be