

# **Asynchronous web-based technologies to support learning**

by

Gabrielle Joy de Villiers

**submitted in partial fulfilment of the requirements of the degree**

**Master of Arts  
in  
Information Science**

in the  
Department of Information Science

University of Pretoria

**Supervisor: Prof. Dr J.C. Cronjé**

2001

## Abstract

Candidate: Gabrielle Joy de Villiers  
Supervisor: Prof. Dr J.C. Cronjé  
Department: Information Science  
Degree: MA (Information Science)  
Title: Asynchronous web-based technologies to support learning

This dissertation reports on an investigation into three web-based technologies to determine their usefulness and the extent to which they support learning. The study comprises three case studies, each examining a separate web-based technology, suitable for diverse groups of learners in terms of age group and background. The main contribution is to determine for whom and how these technologies could be used, with the intention of providing a systematic structure of web-learning possibilities for learners of different ages (children, undergraduates and postgraduates) and types of teaching (contact teaching and distance learning).

It was found that web-based technologies could support learning. Their usefulness depends on how the instructional design addresses the different aspects of web-based learning, and whether or not the course and web-based material match the characteristics/needs of the target group.

**Key words:** web-based learning; web-based technologies; collaborative learning; educational web sites; course management systems; web-based classrooms; learners' characteristics; children; undergraduates; postgraduates; adult learning.

## Samevatting

Kandidaat: Gabrielle Joy de Villiers  
Promotor: Prof. Dr J.C. Cronjé  
Departement: Inligtingkunde  
Graad: MA (Inligtingkunde)  
Titel: Asinkroniseerde webgebaseerde tegnologieë om leer te ondersteun

In hierdie verhandeling word verslag gedoen oor 'n ondersoek na drie webgebaseerde tegnologieë, om hul bruikbaarheid te bepaal asook die mate waarin hulle leer ondersteun. Die studie bestaan uit drie afsonderlike gevallestudies waarin 'n webgebaseerde tegnologie ondersoek word wat geskik is vir diverse groepe leerders in terme van ouderdomsgroep en agtergrond. Die hoofbydrae is om vas te stel vir wie, en hoe hierdie tegnologieë gebruik kan word, met die doel om 'n sistematiese struktuur van web-leermoontlikhede te voorsien vir leerders van verskillende ouderdomme (kinders, voorgraadse en nagraadse studente) en verskillende tipes onderrig (kontakonderrig en afstandsonderrig).

Daar is bevind dat webgebaseerde tegnologieë leer kon ondersteun. Hul bruikbaarheid is afhanklik van hoe die instruksionele ontwerp verskillende aspekte van webgebaseerde leer aanspreek, en of die kursus en webgebaseerde materiaal aan die eienskappe/behoefte van die teikengroep voldoen of nie.

**Sleutelwoorde:** webgebaseerde leer; webgebaseerde tegnologieë; samewerkende leer; onderwys-webwerwe; kursusbestuursisteme; webgebaseerde klaskamers; leerders se kenmerke; kinders; voorgraadse studente; nagraadse studente; volwasse leer.

## Acknowledgements

I wish to sincerely thank the following people:

- My supervisor, Prof Johannes Cronjé, for his wonderful enthusiasm, guidance and support, and for believing that I really could do it.
- All the learners who so willingly took part in the three investigations. Without their involvement, this study would not have been possible.
- Mrs Ruth de Villiers, for her incredible support, editing the document, and general advice.
- My friends and family, for their support and encouragement.
- Rose Purchase, for checking the grammar.
- Jean-Pierre Pretorius, for his support and encouragement, and for his assistance with the graphics and the accompanying CD-ROM version.
- The Centre for Science Development (HSRC, South Africa) for its financial assistance. The opinions expressed and conclusions arrived at in this study are those of the author and are not necessarily to be attributed to the Centre for Science Development.
- The Statistics department for processing the data.
- My Loving Heavenly Father for giving me all the knowledge, strength, insight and wisdom to complete this dissertation.

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## List of Abbreviations

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CGI	Common Gateway Interface
CIE	Computer-Integrated Education
CMC	Computer-Mediated Communication
CMS	Course Management System
FTP	File Transfer Protocol
HCI	Human-Computer Interaction
HOTS	Higher order thinking skills
HTML	Hypertext Mark-up Language
ID	Instructional Design
NCTM	National Council of Teachers of Mathematics
OBE	Outcomes-Based Education
SAQA	South African Qualifications Authority
WBI	Web-based instruction
WWW/Web	World Wide Web

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## Definitions of Terms

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### Asynchronous communication

Where the transmitting and receiving of messages takes place at different times.

### Baby Boomers

Adults born between 1941 and 1960.

### Bulletin Board

An electronic area for posting, displaying and receiving information.

### Collaborative learning

A learning process which emphasises group or co-operative efforts among academic staff and learners, and which stresses active participation and interaction on the part of both learners and instructors. Knowledge is viewed as a social construct and therefore the educational process is facilitated by social interaction in an environment that facilitates peer interaction, evaluation and collaboration (Hiltz, 1995).

### Computer-Mediated Communication (CMC)

Any form of interpersonal communication that uses some form of computer technology to transmit, store, annotate, or present information created by one or more participants. It can help to achieve fundamental educational objectives such as: focusing on active learning, placing the responsibility for learning with learners, and encouraging peer review and teamwork (Wolz, 1997 in: Edwards and Clear, 2001).

### Contact teaching

Traditional class teaching, supplemented by computer lab sessions.

### Course Management System (CMS)

CMSs refer to tools that support the design, delivery and management of online courses (Firiyiwiek, 1999).

### Curriculum 2005

A curriculum based on the ideal of lifelong learning for all South Africans. It aims at equipping learners with the knowledge, competencies and orientations needed for success after they leave school or have completed their training. Its guiding vision is that of a thinking, competent future citizen (South Africa, 1997a).

#### Curriculum 21

A new, revised and streamlined curriculum, to replace Curriculum 2005 (Pretorius, 2000).

#### Discussion list

Uses list-processing software and distributes e-mail to all subscribed users on the list. It is useful for one-to-many communication. A moderator is optional (Clarke, 1998).

#### Distance learning

Distance learning is an instructional delivery system that connects learners with educational resources. Distance learning provides educational access to learners not enrolled in educational institutions and can augment the learning opportunities of current students. The implementation of distance learning is a process that uses available resources and will evolve to incorporate emerging technologies (Porter and Lane, 2000).

#### Educational web sites

Educational web sites, in this specific context, refer to web-based tutorial and practice environments.

#### File Transfer Protocol (FTP)

Standard method of moving files across the Internet.

#### Flaming

A “flame” refers to any message or article that contains strong criticisms, usually irrational or highly emotional.

#### Generation X

Generation X refers to people born between 1961 and 1981. They are the generation after the Baby Boomers, currently in their twenties.

#### Human-Computer Interaction (HCI)

The discipline concerned with the design, evaluation, and implementation of interactive computing systems for human use and the study of major phenomena surrounding them (Dix *et al*, 1998).

#### Hypertext Mark-up Language (HTML)

The language used to create Web documents (Kennedy, 1997).

#### Internet

A co-operatively run global collection of computer networks with a common addressing scheme (Kennedy, 1997). The Internet includes the World Wide Web

(Web), communication technologies (including e-mail, discussion lists, bulletin boards, newsgroups, and real time chat), File Transfer Protocol (FTP), Gopher, Telnet, and Usenet.

#### Instructional Design

Instructional design is the systematic design of teaching and learning environments (Liaw and Huang, 2000).

#### ITFORUM

An electronic discussion forum where people from around the world discuss theories, research, new paradigms, and practices in the field of Instructional Technology. The list is open to anyone interested in Instructional Technology, including postgraduate learners in the field. Leaders in the field are invited to write a short paper, which is posted on the list prior to discussion. This guest discussant remains available electronically on the list for a period of one week to discuss, debate, or answer questions from subscribers (Surry, 1994).

#### Lurking

The practice, particularly of “newbies” (newcomers to the Internet), of reading messages and information posted on interest newsgroups and discussion lists without posting or participating themselves (Clarke, 1998).

#### Millennial Generation

People born since the early 1980s (Zoba, 1997).

#### Open learning

Open learning strives to provide unhindered access to learning resources so that technologically-supported freedom of information may be turned into freedom of education for people pursuing their own learning needs. It emphasizes personal autonomy over studies (Kirkup and Jones, 1996 in: Edwards and Clear, 2001).

#### Outcomes-Based Education (OBE)

An approach which requires learners and lecturers to focus their attention on the desired end results of learning, and the teaching and learning processes that will guide learners to these end results (Geysler, 1999).

#### Web-based classroom

An online learning environment attached to the Web, that supports collaboration between learners through Computer-Mediated Communication, within the context of

constructivist learning. It delivers material to adult learners at locations other than the course delivery centre, and simulates aspects of a physical environment.

**Web-based technologies**

Technologies that run on the Internet or the Web, including web sites, web-based course management systems (CMSs), web-based classrooms, discussion lists, e-mail, etc.

**World Wide Web (Web)**

Graphic and text documents published on the Internet that are interconnected through clickable “hypertext” links (Kennedy, 1997).