

**DEVELOPING A MULTIPLE-CHOICE QUESTION GENERATOR THAT  
PROMOTES COURSE LINKS AND ADMINISTRATIVE CONTROL**

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Date : 27<sup>th</sup> MARCH 2002

## DEDICATION

*Dedicated to my beloved family:  
my parents, my brother, my sisters and my little niece*

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## ABSTRACT

With the increase in cost and resources constraints experienced by many education institutions in Malaysia, the pressure to find alternative method to deliver teaching and assessment increases. Many institutions are moving into web-based teaching and learning because it is evident to be a solution to the overhead constraints and at the same time, support the current teaching and learning environment. Hence, a change in the style of teaching and learning prompted me to develop this e-Quest system. The introduction of distance learning, changes in technology, particularly the wider use of the World Wide Web meant that the Internet is an obvious medium to exploit. This thesis illustrates how software can be developed to face the changing world of education. This project will produce a software prototype of a multiple-choice question generator that promotes course links and administrative control. There are specifically two levels of user. First, the moderator level, which is maintained by instructors, where the system allows moderators to establish courses, upload course content, build quizzes online, modify quizzes, and most important of all linked up the quizzes to the relevant courses. Moderators also have access to the administrative feature such as defining the visibility of the quizzes at the student's access level, defining users access privilege, housekeeping courses, quizzes and questions. Second, the student level, where the system allows the students to select the courses they desire, execute quizzes related to the particular course and check their scores from a list of quizzes they have taken. Although there is still plenty of room for improvement, this prototype serves as a basis for administrating and maintaining a web-based assessment site.

## ABSTRAK

Kos tinggi dan sumber terhad merupakan masalah yang kerap dihadapi oleh institusi pendidikan. Masalah ini menggalakkan pendidik untuk mencari alternatif untuk menyampaikan pengajaran and penilaian. Banyak institusi pendidikan sedang bergerak ke arah pengajaran dan pembelajaran web kerana cara ini terbukti boleh menyelesaikan kekangan overhed dan pada masa yang sama boleh menyokong situasi pengajaran dan pembelajaran semasa. Maka, perubahan cara pengajaran dan pembelajaran telah mendesak saya untuk membangunkan sistem e-Quest ini. Pengenal pendidikan jarak jauh, perubahan teknologi terutamanya dengan penggunaan World Wide Web yang berleluasa mambawa maksud Internet merupakan medium yang ketara untuk diterokai. Sehubungan ini, projek ini mengandungi hasil kajian tentang bagaimana sebuah perisian dapat dibangunkan untuk menghadapi perubahan corak pendidikan. Projek ini bakal menghasilkan sebuah prototaip sistem perisian penjana soalan aneka pilihan yang mempromosikan rangkaian kursus dan pengawalan pentadbiran. Pada khususnya terdapat dua tahap pengguna. Pertamanya, tahap pedyerhana atau orang tengah di mana proses penyelenggaraan dilakukan oleh para pendidik. Sistem ini membolehkan pedyerhana membina kursus, memuat ke atas isi kursus, membangunkan kuiz secara atas talian, mengubahsuaikan kuiz dan yang paling penting sekali merangkaikan kuiz kepada kursus yang bersesuaian. Pedyerhana juga boleh melakukan proses pengurusan seperti mengawal kehadiran kuiz pada tahap pencapaian pelajar, mengawal hak pencapaian pengguna, mengemaskinikan kursus, kuiz dan soalan. Tahap kedua ialah tahap pelajar di mana sistem membolehkan pelajar memilih kursus yang ingin diikuti, mengambil kuiz yang terdapat dalam sesuatu kursus itu, menyemak markah dari senarai kuiz yang telah diduduki. Walaupun sistem ini boleh diperbaiki lagi untuk menjadi lebih lengkap, namun prototaip ini masih boleh berfungsi sebagai sistem penyelenggaraan dan pengurusan untuk laman penilaian secara web.



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**LIST OF ACRONYMS**

<b>ACRONYM</b>	<b>DESCRIPTION</b>
API	Application Programming Interface
ASP	Active Server Pages
CGI	Common Gateway Interface
CIT	Centre For Instructional Technology
CMS	Courseware Management System
CV	Curriculum Vitae
EJB	Enterprise Java Beans
FAQ	Frequently Asked Question
FCIS	First Class Internet Server
GIF	Graphics Interchange Format
GUI	Graphical Use Interface
HE	Higher Education
HTML	Hypertext Markup Language
HTTP	Hypertext Transfer Protocol
ID	Identification
I/O	Input/Output
IVLE	Integrated Virtual learning Environment
J2EE	Java 2 Enterprise Edition`
JDBC	Java Database Connectivity
JPEG	Joint Photographic Experts Group
JSP	JavaServer Pages
LAN	Local Area Network

MCQ	Multiple-Choice Question
NUS	National University of Singapore
ODBC	Open Database Connectivity
OU	Open University
PDF	Portable Document Format
PERL	Practical Extraction and Report Language
RAD	Rapid Application Development
SQL	Sequence Query Language
TCP/IP	Transfer Control Protocol/Internet Protocol
UI	User Interface
UK	United Kingdom
URL	The Uniform Resource Locator
ULM	Units Of Learning Material
VLE	Virtual Learning Environment
WCB	Web Course in a Box
WCT	Web Course Template
WWW	World Wide Web
WYSIWYG	What You See Is What You Get

**APPENDICES**

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## **CHAPTER I**

### **INTRODUCTION**

#### **1.1 Introduction**

Web technology offers new opportunities to restructure the learning and knowledge transfer environment. The Web and e-learning technologies also redefine the geographic boundaries of the traditional education and training provider, such as a university campus, expanding it beyond city, state and national boundaries. This means that we will see an increasing number of courses or subjects designed for delivery over the Web to non-traditional group of students, many of them located off campus. In addition, the Web is increasingly being used to aid traditionally taught courses on campus all over the world.

The extent of this growth is captured in a study carried out by Market Data Retrieval, part of which is summarized below:

“Based on a 44% response rate from 4,284 accredited two- and four-year colleges, the report shows that the number of colleges and universities offering distance degree programs more than doubled from last year. Seventy-two percent of the 1,028 colleges that answered a question on distance education said they were offering a distance-learning program this year; 34% reported offering an accredited degree. The

preponderance of distance education courses remained in the areas of business, social science, and education unchanged from last year. Other disciplines entering the distance-learning arena are computer science, allied health, and general studies (SyllabusWeb, 2000).”

“Currently at the University of Florida (UF) there are over 400 active web-based courses. These courses cover a wide spectrum in terms of Web use since some of them are conducted over the Internet in their entirety while others only use some Web-based facilities. Most of these courses make use of WebCT, a package that facilitates the delivery and management of Web-based courses, as UF has a site license for this software (Grenville Barnes and Joseli Macedo, 2000).”

The e-learning industry is growing rapidly as the number of individuals with access to computers and hand-held-devices increases (Carvahal D.,2000). Universities and corporate-training companies offer high-quality distance education directly over the Web. There are companies on the web that aggregate e-learning products and services from content creators and publishers worldwide, and offer them on a subscription basis to individuals and corporations. As technology increases and audio and video quality on the Web improves, so will the quality and availability of e-learning programs.

Click2Learn ([www.click2learn.com](http://www.click2learn.com)) has created a database of products and services to help individuals and companies find the education they need. Click2Learn also has a skills assessment feature that helps customers evaluate their e-learning needs. Companies or educationists wishing to develop their own training can use the Click2Learn *Toolbook* product in order to develop and sell courses on the Click2Learn site. Once a customer has developed courseware for the Web, the course can be included within the Click2Learn Web site.

Saba ([www.saba.com](http://www.saba.com)) also aggregates e-learning materials and courses.

Companies or educationists can create Saba learning e-stores — to sell their learning products. Saba helps their customers turn traditional instructor-led courses into Web-based training courses. Additionally, customers can use Saba as an e-learning portal where they can find training products for themselves and their employees.

**Blackboard.com** ([www.blackboard.com](http://www.blackboard.com)) allows teachers and educational organizations to post their courses on the Web. Once a company or learning institution has bought a license for the Blackboard.com *CourseInfo* course-development product, they can begin posting and offering their training materials and courses over the Web. For an additional fee, Blackboard.com offers trainer's e-commerce capabilities, special marketing opportunities, more server space and access to customer support.

WebCT ([www.webct.com](http://www.webct.com)) helps educators and students leverage the power of the Web to improve their educational experience. WebCT sells a course development tool that enables educators to quickly build supplementary course materials or full courses to be offered through the WebCT learning hub. The company has offered courses to more than one million students.

Deitel & Associates, Inc. ([www.deitel.com](http://www.deitel.com)) teaches instructor-led training courses for many of the world's largest organization. Deitel publications are used in each of its training courses and in thousands of colleges and universities worldwide.

The Version 1 Deitel Web-based training courses are similar to the Deitel interactive multimedia *Cyber Classroom* products. The courses include the full content of the textbooks as well as complete audio walkthroughs, “live-code” examples and

hundreds of solved problems. The products also include course management, scheduling and assessment features. The Version 2 Web-based training courses emulate the instructor-led training experience with more extensive lecture and lab features.

Colleges and universities have also begun integrating e-learning into their curricula. Jones International University ([www.getmymba.com](http://www.getmymba.com)), the University of Illinois ([www.online.ullinois.edu](http://www.online.ullinois.edu)) and the University of Phoenix ([www.universityphoenix.com](http://www.universityphoenix.com)) are among the first schools to offer complete degree programs online. Students are able to apply online and take courses at home using the Internet.

Many publishers are beginning to add electronic publishing departments to meet the demand for electronic books. Electronic books, or e-books are publications that can be downloaded onto your computer or to a handheld device and read at your convenience. Xlibris ([www.xlibris.com](http://www.xlibris.com)) specializes in publishing books in electronic form. Other electronic publishing companies include iPublish.com ([www.ipublish.com](http://www.ipublish.com)) and netLibrary.com ([www.netlibrary.com](http://www.netlibrary.com)).

"Knowledge is like light. Weightless and intangible, it can easily travel the world, enlightening the lives of people everywhere. Yet billions of people still live in darkness of poverty – unnecessarily (World Bank, 1999)."

There is a growing realization in the developing community that knowledge is a key ingredient in any development strategy. The relationship between knowledge and development was highlighted in a recent World Bank publication (World Bank 1999). It is self-evident that poor countries have less knowledge than richer countries, but what is particularly disturbing, or revealing, is the former's lack of capacity to address this inequity. A comparison of the 'capacity to create knowledge' (measured by spending on

research and development) in low income and high income economies reveals discrepancies that are larger than the difference in income between these two groups (World Bank, 1999). This suggests that at least part of the reason for the economic success of the high-income countries is their ability to develop a knowledge base and disseminate this to civil society. The World Wide Web provides a technology that can address this problem directly. Especially when knowledge can be widely disseminated through the Internet. Therefore, e-learning plays a vital role in developing a knowledge base society.

"There isn't an online replacement for an excellent teacher (Polichar and Bagwell, 2000)."

Traditionalists would adhere to this saying but the World Wide Web is undeniably changing the way we approach and think about education and knowledge transfer. Universities, schools and other training and education institutions must reassess their role in a knowledge society and take advantage of web technology to address the large knowledge gaps between rich and poor.

### **1.1.1 Guidelines for developing a web-based learning site**

Web based learning or e-learning will have a tremendous impact on education and can significantly improve access to educational resources for those students who cannot pursue traditional modes of education or as a supplement for students at home. Educators can utilize the web technologies to create, edit and personalize their contents and the contents can be accessed by students anytime and anywhere. In order to create a good web site for e-learning, we have to know the essential traits of a great Web site.

### **1.1.1.1 Original content is the most important trait of a great Web site.**

Web sites should provide **credible, original content** in as many forms as possible. Original content is the most important trait of a great Web site. Sites that provide only links to other sites are essentially meta-lists (although Yahoo seems to be doing well, while sites that have some information that's useful to the user stand out and will be revisited.

Content is King. Web sites should provide **valuable, timely information** to the user, not lots of data. Web sites should be **updated regularly**. For the information to be valuable it should be **well-edited**. For external links include only the best sites with concise descriptions. For internal content be like a magazine editor, don't rush to publish mediocre or incomplete articles. Typos are unacceptable.

A great e-learning web site should **share everything** you learn. Great Web sites share everything they learn and hear (that's relevant of course) with their users. Give behind the scenes accounts of your latest site features, go open source, start a newsletter, and you'll get more than you give.

### **1.1.1.2 Customize and target your content/site to your users.**

**Custom-tailor** the information to user preferences. One of the Web's strengths is the volume of information available. That is also one of its weaknesses. Sites that offer customization features allow the user to filter the content they see. The future of the Web is "one-to-one" Web sites. These automated, database-driven sites adapt the content, advertising, and even the look to individual users. Technologies such as Web Objects, Java Servlets and

Java Server Pages allow webmasters to create dynamic, interactive, and adaptive Web sites.

A good web site should be **responsive** on a 56 Kbps modem (the typical Web user). **Use graphics sparingly** to convey information. Each graphic takes another trip to the server. Consolidate neighboring graphics or use text or table cells with background colors to speed display. WebMonkey, a site that has a policy "use graphics for graphics and text for text, not graphic text." Size graphics to fit in a typical user's window (a maximum of 465 to 532 pixels wide [i.e., the default Netscape screen to a printed page], for max screen space viewable on all platforms use a max of 580 pixel wide tables to fit the screens).

**Break up tables** vertically for a cascading load to appear more responsive. One huge table takes much longer to display content than stacked smaller tables, which display one at a time. Microsoft's IE5 has a **FIXED** table width feature that speeds table display, unfortunately this is proprietary and does not work on Netscape's browser.

**Optimize graphic file size** for Web display (a maximum of 20 KB per graphic). Utilize page display speedups such as the **WIDTH** and **HEIGHT** attributes for images. Use JPEGs where possible and appropriate (continuous-toned images) and minimize the color palette of GIFs to optimize file size. Provide **text alternatives** to graphics for low-bandwidth users, the blind, and for speed.

**Optimize HTML** by removing excess spaces, comments, tags and commentary, especially on your home page, to minimize file size and download time. Products like Antimony Software's Mizer and VSE's HTML Turbo automate this process by removing excess characters and HTML to optimize your HTML and JavaScript. These products are drag and drop, and should be used as the last step before you upload your page (the files are harder to read

after many of the returns are removed). After optimization your pages will appear to snap onto the screen.

**Be easy to read.** Make your pages as easy to read as possible. Black text on a white background is the easiest to read. There are some nearly impossible to read pages that use backgrounds the same shade as the text (dark text on a dark background and vice versa). If you use a background, stick with the lighter shades and let the text stay black. Use a wide and short background graphic that's non-interlaced and under 1K or `<BODY BGCOLOR="#ffffff">`. HTML 4.0 now includes style sheets that can control page, link, and text color attributes site-wide, and make a great Web site.

#### 1.1.1.3 A Web site should be interactive

**Be interactive.** A good interactivity engages the user and makes your site memorable. After original content, the second most important trait a Web site should have is interactivity. The Web is an interactive hypermedia communications medium that your Web site should reflect. Sites that involve the user and have a sense of fun or adventure will get more hits.

Another advantage of interactivity is **self-generating content**. By allowing your visitors to interact with your site they actually create content for you. Script-driven user surveys and forums allow visitors to share information with others and can help shape your site to better serve their needs. A great example of a user-driven site is [Slashdot](#) a news site for nerds who post short stories submitted by users, and allows users to easily append comments to each story.

#### 1.1.1.4 Users equate poor organization with poor site design

Be **well-organized**. Balance the number of levels (the degree of hyperization) with page length to minimize scrolling and display time. Sun Microsystems found that users equate poor organization with poor site design in their extensive usability study of their home page. They also found that users don't want to scroll. However, the hits on Discovery Channel Online increased by 40% after they went from non-scrolling design to a scrolling design. It depends on your application. Designing pages so important content is "above the fold" is a good idea, though some sites take this maxim to an extreme and cram everything into a cramped mess. Where possible, size your pages important content to fit into the typical user's screen (465 pixels wide by 340 pixels high for a 15" monitor).

Part of having a well-organized site is providing multiple ways of easy navigation. Supply both text and graphics for buttons. Users feel more comfortable if you maintain a consistent look and feel throughout your site.

Use an appropriate **metaphor**. Using a good graphic metaphor for your interface makes the user feel more comfortable navigating your site. Good metaphors, like using an objective paper as a gateway to the world of testing and assessment, can elevate a merely good site to a great site.

## 1.2 Background Of The Study

The rapid growth of e-learning demands more e-learning site as a source of reference, assessment or supplement for learning. Building a site needs web programming techniques to enable users to interact with the site. Interactivity is essential when developing a quiz function that allows for multiple choice, matching, short answer and paragraph questions. Checking answers, grading and results

presentation or analysis requires interactivity, which need a daunting task of web programming. The web programming could enable this.

Most teachers do not have time and skills to develop web site to enrich the teaching-learning environment. Although in the long run they benefit from building a web-based learning site. Imagine the time spent and effort taken to mark and grade 100 paper quizzes that consist of 30 questions. Checking each and every quiz for possible glitches in an automatic grading will take considerably less time than a traditional, paper quiz. In addition, students could check their quizzes and learn from their mistakes immediately after taking the quiz and checking the correct answers. Students do not have to wait for days or sometimes weeks for a teacher to finish marking their paper quizzes, slowing down the learning process.

Online quizzes together with automatic checking and grading features help to give a clear idea of what a student did wrong on the quiz, enriching learning experience. Another possible function of online quizzes is the ability to check marks and course records at any point during the schooling term. With the work spread out evenly throughout the school term, it is important for students to know where they stand after submitting each assignment and after taking each quiz.

Therefore, in order to develop such interactive and dynamic features, teachers need to have the knowledge of web programming and web design what more for teachers who have never used a computer before. Learning web programming and web design is generally beyond the scope of a teacher. Lack of mastery in web programming, web designing propose barriers for teachers to be involved in building e-learning web sites.

When you surf for Web sites of schools in Malaysia, they are either non-existent or only static sites. This is partly because a good interactive and dynamic web site that is able to promote e-learning need webmasters to develop. To employ these webmasters require a high funds. Even if a Webmaster is available, the delivery of knowledge and

information can only be second-hand which might divert from what is correct and original. Thus, it is best for knowledge experts themselves to create their own web pages. They can update and tailor their web pages any time they want without having to wait for webmasters to do it for them.

The e-learning web sites in the Internet are mostly foreign to us because it is developed for people in that particular country, which are irrelevant to the curriculum in Malaysia. The education syllabus of other countries is different from the one in Malaysia especially at the primary and secondary level. Therefore it is essential for local educators to develop e-learning sites in accordance to the education syllabus in Malaysia and appropriate to the learning culture in Malaysia. The move to e-learning fulfill the educational needs of smart school project that is to bring about a systemic change in education, from an exam-dominated culture to a thinking and creative knowledge culture.

### **1.3 Problem Statement**

How can a multiple-choice question generator that promotes course links and administrative control serves as a basis for web-based learning and assessment system to support flexible education?

### **1.4 Project Objectives**

The objectives of developing the e-shell is to enable

- i. Moderators to establish courses for a variety of subjects by uploading files in HTML or PDF format.

## REFERENCE

- Ali Bahrami (1999). "Object Oriented Systems Using The Unified Modeling Language." USA: Irwin McGraw-Hill, 5-6, 28-32, 44-54.
- Ali Jafari (1999). "The Rise of a New Paradigm Shift in Teaching and Learning."  
<http://www.thejournal.com/magazine/vault/A2289.cfm>. (Date:19/02/2001).
- Allaire JRun Studio v 3.0 (2000). "Developing Application With JRun" CD-Rom
- Barnes, Grenville and Joseli Macedo (2000). "E-learning: Experience With Web-Aided And Web-Based Education At The University Of California." California: URISA Journal. <http://www.urisa.org/Journal/Under.Review/barnes%20e.gov/e-learning.htm> (Date: 20/03/2001)
- Beer, S. (1981) "The Brain of the Firm." 2nd Ed, Chichester: John Wiley.:
- Card, Stuart K. (1993). "Human Computer Interaction (HCI)". IEEE Journal

- Carvahal, D (2000). "4 Giants Set to Embrace Electronic Publishing." The New York Times, 23 May 2000. <http://www.nytimes.com/learning/index.html> (Date: 20/07/2001)
- Cay S. Horstmann, Gary Cornell (1999). "Core JAVA TM 2 Volume I-Fundamentals." USA: Sun Microsystem Press A Prentice Hall Title. xx-xxii, 1-20.
- Clinton, Scott (2000). "Developing For Multi-Tier Distributed Computing Architectures with Delphi Client/ServerSuite2.0". Borland International. Three-Tier Architecture. <http://ecos.kharkov.ua/~lz/delphi/article/d323tie2.html#three> (Date: 15/11/2001)
- Collis, B. (1996). "Tele-learning in a Digital World." London: Thomson Computer Press.
- Crawley, R.M.(1999) "Evaluating CSCL - Theorists' & Users' Perspectives" <http://www.bton.ac.uk/cscl/jtap/paper1.htm> (Date: 15/11/2001)
- Dastbaz and Kalafatis (1996). "Hypermedia Design and Development Process Model". CTI Annual Conference.
- Deitel, H. M., P. J. Deitel, T. R. Neito (2000). "e-Business 7e-Commerce How To Program." USA: Prentice-Hall, Inc. 95-96.
- Forta, Ben and Nate Weiss (2001). "The Macromedia Coldfusion 5 Web Application Construction Kit". 4<sup>th</sup> Edition. QUE
- Gande, Paul B. (2000). "Top 10 IT Challenges of 2000." 10 EDUCASE QUATERLY

Gardner, Lesley and David White (2001). "Computer Supported Learning A Large Scale, Web-based Learning And Assessment System to support Flexible Education." Proceedings of the 34<sup>th</sup> Hawaii International Conference on System Sciences

Graziano, Almerindo, Paolo Maresca, Stefano Russo (2000). "Experience with the GESTALT On-Line Learning Support System." Proceedings of 26<sup>th</sup> EUROMICRO Conference 2000.

Gundavaram, Shishir (1996). "CGI Programming on the World Wide Web". O'Reilly Online Catalog. Chapter [http://www.oreilly.com/openbook/cgi/ch01\\_02.html](http://www.oreilly.com/openbook/cgi/ch01_02.html) (Date: 12/03/2001)

Hall, Marty (2000). "Core Servlets and JavaServer Pages TM." USA: Sun Microsystems Press A Prentice Hall Title. 5-12.

Harasim, Linda (1999) "A Framework for Online Learning: the Virtual-U." IEEE Journal.

Key point Software. "Web Programming-Web Site Development".  
[http://www.keypoint.com/web\\_development/web\\_dev.htm](http://www.keypoint.com/web_development/web_dev.htm) (12/03/2001)

Landon, B. "Online Educational Delivery Applications: A Web Tool for Comparative Analysis." <http://www.ctt.bc.ca/landonline/index.html> (12/03/2001)

- Laurillard, D. (1993) "Rethinking University Teaching - A Framework for the Effective Use of Educational Technology." London: Routledge.
- Liber, O. (1998) "Structuring Institutions to Exploit Learning Technologies: A Cybernetic Model." *Alt-J* 6 (1).
- Maki, William S. and Ruth H.Maki (1997). "Learning Without Lecturers: A Case Study." *Internet Watch*.
- Mason, R. (1998) "Models of Online Courses." *ALN Magazine* 2 (2).  
[http://www.aln.org/alnweb/magazine/vol2\\_issue2/Masonfinal.htm](http://www.aln.org/alnweb/magazine/vol2_issue2/Masonfinal.htm) (Date: 16/03/2001)
- Milligan, C. (1998) 'The role of VLEs in on-line delivery of staff development' *JTAP Report 573*. <http://www.icbl.hw.ac.uk/jtap-573> (Date: 16/03/2001)
- Morris, Charlie (2000). "A Look at the Web Development World Ahead"  
<http://wdvl.com/Internet/History/LookAhead/index.html> (Date: 5/03/2001)
- National Committee of Inquiry into Higher Education (1997) "Higher Education in the Learning Society" <http://www.leeds.ac.uk/ncihe/> (Date: 5/03/2001)
- Nesamalar Chitravelu, Saratha Sithamparam and The Soo Choon (1997). "ELT Methodology: Principles and Practice" 3rd Edition. Shah Alam: Fajar Bakti. 298-317
- Rahmalan Ahamad (2000). "Research Report Writing." *Universiti Teknologi Malaysia*
- Satzinger, W. John, Robert B.Jackson and Stephen D. Burd (2000). "System Analysis and Design in a Changing World" Thomson Learning: Course Technology.

Schmuller, Joseph (1999). "Teach Yourself UML in 24 Hours." USA: SAMS. 188-200.

Shneiderman, Ben (1992). "Designing the User Interface Strategies For Effective Human-Computer Interaction". 2<sup>nd</sup> Edition. Addison-Wesley Publishing Company.

Sunil Hazari (2001). "Web Based Assessment." <http://sunil.umd.edu/> (Date: 25/1/2002)

The Common Gateway Interface.(2000).  
<http://hoohoo.ncsa.uiuc.edu/cgi/overview.html/> (Date: 20/02/2001)

Yale C/AIM WWW Style Manual.(2000) "What Makes A Great Web Site?"  
<http://www.webreference.com/greatsite.html> (Date: 20/02/2001)