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

VIVIEN WEE MUI EIK @ BEE JADE

This project report is submitted as a partial fulfillment for the conferment of a
Master of Science (Information Technology-Education)

Faculty of Computer Science and Information Systems
Universiti Teknologi Malaysia

MARCH 2002
Universiti Teknologi Malaysia

BORANG PENGESAHAN STATUS TESIS

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

SESJI PENGAJIAN: 2001/2002

Saya VIVIEN WEE MUI EIK @ BEE JADE (HURUF BESAR)

mengaku menberakun tesis (PSM/Sarjana/Doktor Falsafah) ini disimpan di Perpustakaan Universiti Teknologi Malaysia dengan syarat-syarat kegunaan seperti berikut:

1. Tesis adalah hakmilik Universiti Teknologi Malaysia.
2. Perpustakaan Universiti Teknologi Malaysia dibenarkan membuat salinan untuk tujuan pengurusan sahaja.
3. Perpustakaan diberiaturan membuat salinan tesis ini sebagai bahan pertukaran antara institusi pengurusan tinggi.
4. **Sila tandakan (✓)

☐ SULIT (Mengandungi maklumat yang berdaur jual keselamatan atau kepentingan Malaysia seperti yang termaktub di dalam AKTA RAHSIA KASM1 1972)

☐ TERHAD (Mengandungi maklumat TERHAD yang telah ditentukan oleh organisasi/badan di mana penyelidikan dijalankan)

✓ TIDAK TERHAD

Disahkan oleh

(TANDATANGAN PENULIS) (TANDATANGAN PENULIS)

Alamat Tetap: 217-G Jalan Thamby Abdullah
Bandar Hilir
75000, MELAKA

EN NOR AZMAN ISMAIL
Nama Penyelia II


CATATAN:
* Potong yang tidak berkenaan.
** Jika tesis ini SULIT atau TERHAD, sila lampirkan surat dari pihak berkuasa/organisasi berkenaan dengan menyatakan sekali sebub dan tempoh tesis ini perlu dikelaskan sebagai SULIT atau TERHAD.
✓ Tesis dimaksudkan sebagai tesis bagi lizahah Doktor Falsafah dan Sarjana secara penyelidikan, atau disertasi bagi pengujian secara kerja kursus dan penyelidikan, atau Laporan Projek Sarjana Muda (PSM).
"We declare that we have read this thesis and in our opinion this thesis has satisfied
the scope and quality for the award of the degree of
Master of Science (Information Technology-Education)".

Signature : 

Name of Supervisor I :  Associate Professor Noraniah Mohd. Yassin

Date :  27th MARCH 2002

Signature : 

Name of Supervisor II :  En Nor Aznial Ismail

Date :  27th MARCH 2002
DECLARATION STATEMENT

I declare that this project report entitled "DEVELOPING A MULTIPLE-CHOICE QUESTION GENERATOR THAT PROMOTES COURSE LINKS AND ADMINISTRATIVE CONTROL" is the result of my own research except as cited in references. This report has not been accepted for any degree and is not concurrently submitted in candidature of any degree.

Signature : ______________________

Name of Candidate : VIVIEN WEE MUI EIK @ BEE JADE

Date : 27th MARCH 2002
DEDICATION

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

The author wishes to express her grateful appreciation to all who have contributed directly and indirectly to the preparation of this project. To my Project Supervisors, Prof Madya Noraniah Mohd Yassin, En Nor Azman Ismail and En Rosely Kumoi, an additional measure of thanks is due. En Rosely Kumoi was initially supervising this project, but his untimely leave deprived me of his guidance. To all my supervisors, I pay tribute to you for your invaluable comments, advice, guidance and encouragement throughout the preparation of this project.

Special thanks to the Deputy Dean (Postgraduate Studies) Prof Madya Dr Rose Alinda Alias for her untiring support, and to my fellow course mates for making this study a wonderful experience.

Finally, the author expresses her sincere thanks to her beloved family and friends, for the encouragement, inspiration and patience, which they have provided at every step during this course of studies.
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

## CONTENTS

<table>
<thead>
<tr>
<th>CHAPTER</th>
<th>TITLE</th>
<th>PAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>TITLE</td>
<td>i</td>
</tr>
<tr>
<td></td>
<td>DECLARATION STATEMENT</td>
<td>ii</td>
</tr>
<tr>
<td></td>
<td>DEDICATION</td>
<td>iii</td>
</tr>
<tr>
<td></td>
<td>ACKNOWLEDGEMENTS</td>
<td>iv</td>
</tr>
<tr>
<td></td>
<td>ABSTRACT</td>
<td>v</td>
</tr>
<tr>
<td></td>
<td>ABSTRAK</td>
<td>vi</td>
</tr>
<tr>
<td></td>
<td>TABLE OF CONTENTS</td>
<td>vii</td>
</tr>
<tr>
<td></td>
<td>LIST OF FIGURES</td>
<td>xiii</td>
</tr>
<tr>
<td></td>
<td>LIST OF TABLES</td>
<td>xv</td>
</tr>
<tr>
<td></td>
<td>LIST OF ACRONYMS</td>
<td>xvi</td>
</tr>
<tr>
<td></td>
<td>LIST OF APPENDICES</td>
<td>xviii</td>
</tr>
</tbody>
</table>

## I INTRODUCTION

1.1 Introduction  

1.1.1 Guidelines for developing a web-based learning site  
1.1.1.1 Original content is the most important trait of a great Web site  
1.1.1.2 Customize and target your content/site to your users  

1
1.1.1.3 A Web site should be interactive 8
1.1.1.4 Users equate poor organization with poor site design 9

1.2 Background of Study 9
1.3 Problem Statement 11
1.4 Project Objective 11
1.5 Project Scope 12

II LITERATURE REVIEW

2.1 Introduction 13
2.2 A Case Study: Testing & Assessment Concept in the KIKO Web site – www.kiko.com 14
  2.2.1 What is Kiko? 15
  2.2.2 Who is Kiko for? 16
  2.2.3 How is the Kiko site different from other educational sites 16
  2.2.4 How does Kiko operate? 17
  2.2.5 Where to host after creating the lessons? 18
  2.2.6 What is the function of Kiko? 18
2.3 Web Development Trend 21
  2.3.1 A shift from static web sites 21
  2.3.2 Dynamic sites take over 22
  2.3.3 User interactivity 25
2.4 Dynamic web general architecture 27
2.5 A study on Traditional CGI 28
  2.5.1 Gateways 30
2.6 What is Coldfusion? 31
2.6.1 The Advantages of Coldfusion Applications 31
2.7 Case Study On Virtual Learning Environment 32
  2.7.1 Virtual Learning Environment Systems 33
    2.7.1.1 Learning Space 33
    2.7.1.2 WebCT 35
    2.7.1.3 TopClass 36
    2.7.1.4 Virtual University 37
    2.7.1.5 Web Course in A Box 38
    2.7.1.6 CourseInfo 39
    2.7.1.7 FirstClass Collaborative Classroom 39
    2.7.1.8 Librarian 40
    2.7.1.9 ARIADNE 41
    2.7.1.10 CoMentor 41
    2.7.1.11 CoSE 42
    2.7.1.12 Learning Landscape 43
  2.7.2 Discussion On Virtual Learning Environment 44
  2.7.3 What is Virtual Learning Environment 46
  2.7.4 Evaluation of Virtual Learning Environment using
      the Conversational Framework 50
  2.7.5 Evaluation Criteria For Virtual Learning Environment 53
2.8 What is Courseware Management System 55
2.9 A Case Study on Integrated Virtual Learning
    Environment – Integrating Courseware Management System
    with Web Site Creation Tool by Centre for Instructional
    Technology National University of Singapore 56
2.10 Testing And Assessment 58
  2.10.1 Types Of Test Item: Objective And Subjective Tests 60
  2.10.2 Strengths and Weaknesses of Multiple-Choice
      Questions Tests 62
2.11 Web Based Assessment 62
  2.11.1 Common Gateway Interface Technology in Web Based
Assessment 64
2.11.2 Java Script Technology In Web Based Assessment 65
2.11.3 Microsoft Technology In Web Based Assessment 65
2.11.4 Lacking Of Administrative Control In The Web Based Assessment Systems 66

III METHODOLOGY 68

3.1 Introduction 69
3.2 System Development Life Cycle 68
3.3 The Prototyping Approach to Development 69
	 3.3.1 Steps In Prototyping Development Approach 69
3.4 The Rationale Of Using Prototyping Approach 71
3.5 Prototyping Tool Requirement 71

IV ANALYSIS 73

4.1 Introduction 74
4.2 Use Case Diagram 75
	 4.2.1 Scenarios 76
4.3 Sequence Diagram 77
4.4 Collaboration Diagram 78
V DESIGN AND IMPLEMENTATION

5.1 Introduction 79
5.2 System Specification 80
5.3 Architectural Design 81
5.3.1 System Architecture 81
5.4 Implementation 84
5.5 Level of Users 84
5.5.1 Participant Level: The Student’s User Interface 85
5.5.2 Course And Quiz Provider Level: The Moderator’s Interface 89
5.5.3 Create Course 91
5.5.4 Housekeeping Courses 92
5.5.5 Make Quizzes 92
5.5.6 Modify Quizzes 94
5.5.7 Housekeeping Users 94
5.5.8 Housekeeping Moderators 95
5.5.9 Housekeeping Questions 96
5.6 User Manual 97

VI TESTING AND EVALUATION 98

6.1 Introduction 98
6.2 System Testing 98
6.3 Acceptance Test 99
6.3.1 Questionnaire (Refer Appendix E) 99
6.3.2 Overall User Reaction 100
6.3.3 User Interface 101
6.3.4 Analysis Of The Results 102
6.3.5 Functions Of System (Moderator Level) 103
6.3.6 Functions Of System (Student Level) 103
6.4 Concluding Remark 104

VII CONCLUSION AND FUTURE WORK

7.1 Introduction 105
7.2 The Advantages Of The e-Quest System 105
7.3 Suggestions For Future Work 107
7.4 Conclusion 108

REFERENCE 109

APPENDICES

APPENDICES A-F 114-178
<table>
<thead>
<tr>
<th>FIGURE NO.</th>
<th>TITLE</th>
<th>PAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.1</td>
<td>General Architecture for Dynamic Web Site</td>
<td>27</td>
</tr>
<tr>
<td>2.2</td>
<td>Simple Comparison of Three Dynamic Web Page Implementation</td>
<td>28</td>
</tr>
<tr>
<td>2.3</td>
<td>How a browser, an HTML form, a Server and a CGI application interact via the Internet</td>
<td>29</td>
</tr>
<tr>
<td>2.4</td>
<td>A gateway to a database</td>
<td>30</td>
</tr>
<tr>
<td>2.5</td>
<td>A schematic of a Prototypical VLE</td>
<td>46</td>
</tr>
<tr>
<td>2.6</td>
<td>The Conversational Framework</td>
<td>52</td>
</tr>
<tr>
<td>3.1</td>
<td>Prototyping Development Approach</td>
<td>70</td>
</tr>
<tr>
<td>3.2</td>
<td>Prototyping tools –Coldfusion Studio Running Under Coldfusion Application Server and Personal Web Server</td>
<td>72</td>
</tr>
<tr>
<td>4.1</td>
<td>Use Case Diagram Shows The Relationship Of Moderator and The Related Use Cases Within The System</td>
<td>75</td>
</tr>
<tr>
<td>4.2</td>
<td>Use Case Diagram Shows The Relationship Of Student And The Related Use Cases Within The System</td>
<td>76</td>
</tr>
<tr>
<td>4.3</td>
<td>The Sequence Diagram For “Create Course” Use Case</td>
<td>77</td>
</tr>
<tr>
<td>4.4</td>
<td>Collaboration Diagram of “Create Course” Use Case</td>
<td>78</td>
</tr>
<tr>
<td>Section</td>
<td>Title</td>
<td>Page</td>
</tr>
<tr>
<td>---------</td>
<td>----------------------------------------------------------------------</td>
<td>------</td>
</tr>
<tr>
<td>5.1</td>
<td>The Design Process Model</td>
<td>79</td>
</tr>
<tr>
<td>5.2</td>
<td>Three-tier Architecture</td>
<td>80</td>
</tr>
<tr>
<td>5.3</td>
<td>System Architecture of e-Quest system</td>
<td>82</td>
</tr>
<tr>
<td>5.4</td>
<td>Interaction Between HTTP Server (Personal Web Server) And Application Server (Coldfusion Application Server)</td>
<td>84</td>
</tr>
<tr>
<td>5.5</td>
<td>First Page of Student's Interface</td>
<td>85</td>
</tr>
<tr>
<td>5.6</td>
<td>Course Content and Related Quizzes</td>
<td>86</td>
</tr>
<tr>
<td>5.7</td>
<td>Quiz Registration Form</td>
<td>87</td>
</tr>
<tr>
<td>5.8</td>
<td>Question Of The Quiz</td>
<td>87</td>
</tr>
<tr>
<td>5.9</td>
<td>Identification Form To Retrieve Scores</td>
<td>88</td>
</tr>
<tr>
<td>5.10</td>
<td>List Of Quizzes Taken</td>
<td>88</td>
</tr>
<tr>
<td>5.11</td>
<td>Score Of The Quiz Taken</td>
<td>89</td>
</tr>
<tr>
<td>5.12</td>
<td>Moderator's Login</td>
<td>90</td>
</tr>
<tr>
<td>5.13</td>
<td>The Moderator's Provider And Site</td>
<td>90</td>
</tr>
<tr>
<td></td>
<td>Maintenance Area</td>
<td></td>
</tr>
<tr>
<td>5.14</td>
<td>Course Setup Page</td>
<td>91</td>
</tr>
<tr>
<td>5.15</td>
<td>Course Upload Page</td>
<td>91</td>
</tr>
<tr>
<td>5.16</td>
<td>Housekeeping Courses – Delete Courses</td>
<td>92</td>
</tr>
<tr>
<td>5.17</td>
<td>First Page Of Make Quizzes Function</td>
<td>93</td>
</tr>
<tr>
<td>5.18</td>
<td>Subsequent Questions Of The Same Quiz</td>
<td>93</td>
</tr>
<tr>
<td>5.19</td>
<td>Modify Quizzes Page</td>
<td>94</td>
</tr>
<tr>
<td>5.20</td>
<td>Housekeeping Users – Reset/Delete Students</td>
<td>95</td>
</tr>
<tr>
<td>5.21</td>
<td>Housekeeping Moderators –</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Insert/Delete Moderators</td>
<td>96</td>
</tr>
<tr>
<td>5.22</td>
<td>Housekeeping Questions</td>
<td>97</td>
</tr>
<tr>
<td>6.1</td>
<td>Overall User Reaction</td>
<td>101</td>
</tr>
</tbody>
</table>
# LIST OF TABLES

<table>
<thead>
<tr>
<th>TABLE NO.</th>
<th>TITLE</th>
<th>PAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.1</td>
<td>Different Types Of Tests And Their Purpose</td>
<td>59</td>
</tr>
<tr>
<td>2.2</td>
<td>Strengths And Weaknesses Of Objective and</td>
<td>61</td>
</tr>
<tr>
<td></td>
<td>Subjective Tests</td>
<td></td>
</tr>
</tbody>
</table>
## LIST OF ACRONYMS

<table>
<thead>
<tr>
<th>ACRONYM</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>API</td>
<td>Application Programming Interface</td>
</tr>
<tr>
<td>ASP</td>
<td>Active Server Pages</td>
</tr>
<tr>
<td>CGI</td>
<td>Common Gateway Interface</td>
</tr>
<tr>
<td>CIT</td>
<td>Centre For Instructional Technology</td>
</tr>
<tr>
<td>CMS</td>
<td>Courseware Management System</td>
</tr>
<tr>
<td>CV</td>
<td>Curriculum Vitae</td>
</tr>
<tr>
<td>EJB</td>
<td>Enterprise Java Beans</td>
</tr>
<tr>
<td>FAQ</td>
<td>Frequently Asked Question</td>
</tr>
<tr>
<td>FCIS</td>
<td>First Class Internet Server</td>
</tr>
<tr>
<td>GIF</td>
<td>Graphics Interchange Format</td>
</tr>
<tr>
<td>GUI</td>
<td>Graphical Use Interface</td>
</tr>
<tr>
<td>HE</td>
<td>Higher Education</td>
</tr>
<tr>
<td>HTML</td>
<td>Hypertext Markup Language</td>
</tr>
<tr>
<td>HTTP</td>
<td>Hypertext Transfer Protocol</td>
</tr>
<tr>
<td>ID</td>
<td>Identification</td>
</tr>
<tr>
<td>I/O</td>
<td>Input/Output</td>
</tr>
<tr>
<td>IVLE</td>
<td>Integrated Virtual learning Environment</td>
</tr>
<tr>
<td>J2EE</td>
<td>Java 2 Enterprise Edition</td>
</tr>
<tr>
<td>JDBC</td>
<td>Java Database Connectivity</td>
</tr>
<tr>
<td>JPEG</td>
<td>Joint Photographic Experts Group</td>
</tr>
<tr>
<td>JSP</td>
<td>JavaServer Pages</td>
</tr>
<tr>
<td>LAN</td>
<td>Local Area Network</td>
</tr>
<tr>
<td>Term</td>
<td>Definition</td>
</tr>
<tr>
<td>--------</td>
<td>--------------------------------------------</td>
</tr>
<tr>
<td>MCQ</td>
<td>Multiple-Choice Question</td>
</tr>
<tr>
<td>NUS</td>
<td>National University of Singapore</td>
</tr>
<tr>
<td>ODBC</td>
<td>Open Database Connectivity</td>
</tr>
<tr>
<td>OU</td>
<td>Open University</td>
</tr>
<tr>
<td>PDF</td>
<td>Portable Document Format</td>
</tr>
<tr>
<td>PERL</td>
<td>Practical Extraction and Report Language</td>
</tr>
<tr>
<td>RAD</td>
<td>Rapid Application Development</td>
</tr>
<tr>
<td>SQL</td>
<td>Sequence Query Language</td>
</tr>
<tr>
<td>TCP/IP</td>
<td>Transfer Control Protocol/Internet Protocol</td>
</tr>
<tr>
<td>UI</td>
<td>User Interface</td>
</tr>
<tr>
<td>UK</td>
<td>United Kingdom</td>
</tr>
<tr>
<td>URL</td>
<td>The Uniform Resource Locator</td>
</tr>
<tr>
<td>ULM</td>
<td>Units Of Learning Material</td>
</tr>
<tr>
<td>VLE</td>
<td>Virtual Learning Environment</td>
</tr>
<tr>
<td>WCB</td>
<td>Web Course in a Box</td>
</tr>
<tr>
<td>WCT</td>
<td>Web Course Template</td>
</tr>
<tr>
<td>WWW</td>
<td>World Wide Web</td>
</tr>
<tr>
<td>WYSIWYG</td>
<td>What You See Is What You Get</td>
</tr>
</tbody>
</table>
### APPENDICES

<table>
<thead>
<tr>
<th>APPENDIX</th>
<th>TITLE</th>
<th>PAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Gantt Chart Of Project I And Project II</td>
<td>114</td>
</tr>
<tr>
<td>B</td>
<td>Scenarios Of Use Cases</td>
<td>117</td>
</tr>
<tr>
<td>C</td>
<td>Sequence Diagrams</td>
<td>131</td>
</tr>
<tr>
<td>D</td>
<td>Collaboration Diagrams</td>
<td>143</td>
</tr>
<tr>
<td>E</td>
<td>Questionnaire</td>
<td>151</td>
</tr>
<tr>
<td>F</td>
<td>User Manual</td>
<td>160</td>
</tr>
</tbody>
</table>
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) 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) 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) 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) 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) 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), the University of Illinois (www.online.illinois.edu) and the University of Phoenix (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) specializes in publishing books in electronic form. Other electronic publishing companies include iPublish.com (www.ipublish.com) and netLibrary.com (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 \texttt{<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


http://www.thejournal.com/magazine/vault/A2289.cfm (Date: 19/02/2001).


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 34th Hawaii International Conference on System Sciences


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


Key point Software. “Web Programming-Web Site Development”.
http://www.keypoint.com/web_development/web_dev.htm (12/03/2001)


http://www.aln.org/alnweb/magazine/vol2_issue2/Masonfinal.htm (Date: 16/03/2001)


http://wdvl.com/Internet/History/LookAhead/index.html (Date: 5/03/2001)


http://hoohoo.ncsa.uiuc.edu/cgi/overview.html/ (Date: 20/02/2001)

http://www.webreference.com/greatsite.html (Date: 20/02/2001)