Evaluation of OUM's Web-Based HTML Modules from the Theoretical and Practical Perspective towards proposing an Improved Model

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Project Number
URI-GR-2010-006

This research was supported by Grant No. URI-GR-2010-006 from Open University Malaysia, Kuala Lumpur.

OUM'S INTERNALLY FUNDED RESEARCH PROJECT

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ACKNOWLEDGEMENTS

This research project would not have been possible without the support from the management of the University. In particular, we would like to convey our deepest appreciation and thanks to the following people who have provided their abundant assistance, support and guidance in one way or another.

- YBhg Prof Emeritus Tan Sri Anuwar Ali (President)
- YBhg Prof Dr Mansor Fadzil (Senior Vice President)
- Dr. Tina Lim Swee Kim (IQRI Director)
- IQRI research assistant
- CiDT Instructional Designers

EXECUTIVE SUMMARY

Open University Malaysia (OUM) is an open and distance learning (ODL) institution in Malaysia. It adopts a blended learning mode of instructional delivery which comprises three components: self managed learning using the print modules, online learning and face-to-face instruction. The self-managed learning component constitutes about 80% of the estimated learning time and the print module is the main resource used by learners to guide their learning. In the past two years, the University has been embarking on a major project of converting all its print modules to the web-based HTML modules. This research study was carried out to determine the efficacy of the web-based HTML modules as a self-managed learning tool. This research study research adopted a two-phase approach. In the first phase, the modules were thoroughly examined by the researchers to determine the extent to which the web-based HTML modules comply with criteria of an effective learning tool from the theoretical perspective. The examination revealed a number of missing elements which are essential for effective online self-managed learning. Subsequently, a survey was conducted in the second phase to depict users' ratings (OUM learners) on the adequacy of the modules from the technical, interface-design, learner-support and instructional perspective. Design of Items for evaluating the adequacies were closely guided by the "seven principles of good practice in undergraduate education" (Chickering and Gamson ,1987). Research results reveal that that the web-based HTML modules are generally perceived by learners to be a useful self-managed learning tool. Pearson Product correlation calculated shows that the learners' perceptions on the adequacies of the modules have weak correlations with their competencies in ICT despite the fact that using web-based modules may require some knowledge or skills in ICT. T-test conducted also reveals that there is only slight difference between male learners and female learners towards the perceived quality of the modules. Examination form the theoretical perspective together with feedbacks from the users however help to identify some missing but necessary elements for effective learning. Based on the analyses, a revised conceptual framework for the design and development of the revised web-based interactive modules (WebIM) was proposed.

Introduction

In recent years, the rapid advancement of information and communication technologies, particularly web-based technology, has paved the way for new patterns and innovations in teaching and learning. Open and distance learning (ODL) in particular, is now an important component of our main stream education system. It is particularly popular among adult learners who are unable to pursue their studies on a fulltime basis. ODL is viewed by many adult learners as an alternative to conventional education as it has a more flexible instructional and learning structure that frees them from the constraints of time and place of learning.

In Malaysia, Open University Malaysia (OUM) is well recognised as the pioneer in ODL education. For the past ten years, OUM has been seeking ways and means to continuously improve the quality of ODL education it offers. OUM strives to make ODL an alternative model of learning which is even better than the traditional classroom education.

However, the issue of equivalence between conventional classroom-based learning and ODL is often raised. Some educators are still doubtful of the efficacy of virtual learning via ODL as compared to the traditional face-to-face form of learning (Bernard, Abrami, Lou Borokhovsk, Wade, Wozney, et al. 2004; Hanny & Newvine 2006).

In OUM, courses are delivered using a blended mode of instruction. The blended mode comprises three components; self managed learning using print modules, face-to-face instruction and online learning via OUM's proprietary learning system, MyVLE. Of the three components, the self-managed learning component constitutes approximately 80% of learning time. Learners use the print modules provided by OUM as a guide in managing their own learning. The other two components, the face-to-face instruction and online learning, constitute only about 12% and 8% of the total estimated learning time respectively. To date, OUM has produced a total of more than 1500 print modules for its learning programmes. It is thus apparent that print modules play a critical role in determining the success in OUM's implementation of ODL. Accordingly, in any effort to improve OUM's learning, the strengths and weaknesses of print modules should be the prime factor to be studied carefully.

OUM realises that to gain competitive advantage, the organisation has to constantly improve its learning system and tools. The Centre for Instructional Design and Technology (CiDT) at OUM has been entrusted by the University to explore various possibilities in leveraging the Web and Internet technology for better online learning. One major effort was to convert the print modules to the web-based format in the form of HTML modules that could be launched from MyVLE platform. Currently, more than 500 HTML modules have been made available online.

Very often, in many educational courseware and learning system development tasks, the instructional designers play the greatest role. However, many of these instructional designers have greater strengths in design rather than instruction. On the other hand, academicians and educators who are well-versed in pedagogical principles often do not have sufficient knowledge about what technology can do for education, particularly, for online teaching and learning. Consequently, they are seldom involved in the instructional design process. This raises the issue of whether the instructional design process is supported by sound pedagogical principles. Besides this, learners are also seldom consulted in the development and implementation of learning tools and learning systems. It needs to be highlighted that learners themselves are the ultimate users of the tools or the system. Therefore, besides the educators, learners are probably the most appropriate group to inform the instructional designers and learning system developers regarding the effectiveness of the learning system tool.

Research Objectives and Research Questions

The main purpose of this research project was to carry out a thorough evaluation on the web-based HTML modules to determine their efficacy as an alternative to the print modules. The research also investigated the strengths and weaknesses of the web-based HTML modules with the intention to propose an improved model. To achieve the research purpose and objectives, the research adopted a two phase approach. The first phase was the evaluation of the web-based HTML modules by the research team members who are also educators, on the efficacy of the web-based HTML modules as a learning tool from theoretical perspectives. The second phase was conducted to gather information from both learners and tutors regarding the adequacies of the web-based HTML modules as an alternative to the print modules.

The research study seeks to answer the following research questions:

1. To what extent do the web-based HTML modules comply with the elements that facilitate learning from the theoretical perspective?

2. What is OUM learners' perceived quality of the web-based HTML modules from the perspective of technical adequacy?

3. What is OUM learners' perceived quality of the web-based HTML modules from the perspective of interface-design adequacy?

4. What is OUM learners' perceived quality of the web-based HTML modules from the perspective of learner-support adequacy?

5. What is the learners' perceived quality of the web-based HTML modules from the perspective of instructional adequacy?

6. Is there any difference between male learners and female learners in their overall perceived quality of the web-based HTML modules?

7. Is there a correlation between the learners' competency level in the use of the computer and their perceived overall quality of the web-based HTML modules?

8. How should the framework for the web-based HTML modules be designed to enhance its efficacy as a self-managed learning tool and resource?

Literature Review

Self-managed learning is the main and the most important component of pedagogic discourse in the blended learning mode that OUM practises. While the performance of OUM's learners in their study depended greatly on their ability to carry out effective self-managed learning, it is naive to assume that learners by themselves would be competent in self-managed learning (Ottewill, 2002). The effectiveness of self-managed learning depends on the availability of appropriate resource, tools and learning support. Until recently, OUM had been heavily relying on the use of print modules as the main resource to guide learners in their self-managed learning.

The use of print modules provides an alternative means to learning, replacing the use of traditional text. Print modules present course content in a more organised and compressed form. Usually, besides the more focused course content, print modules include text-based assessment and practice activities in the form of short questions and discussion topics. Even though the print modules free learners from the constraint of learning at fixed time and place, they nevertheless have a number of weaknesses. In print modules, the organisation of content is linear. Therefore, the way that a learner learns using the module is somewhat governed by the designer's epistemology. The rigidity of the content structure forbids learners to freely and easily select their own learning paths with regards to the module. Such learning does not encourage exploratory learning. Also, learning using print modules requires the learner to be self-motivated. The print module is inherently a "passive" resource. It relies on the learners to be self-motivated. There is no push factor offered by the print modules to initiate the learning process. It is also not able to generate interactions that communicate high expectations or promote time on task.

Furthermore, information in print modules is presented in the form of text, static pictures and images. Such mode of delivery may be useful if learning is just the inert process of transferring information from one to another. But constructivists believe that learning is an active process of knowledge by interacting with the learning environment (Lefoe, 1998; Huang, 2002) . Thus, it is ineffective to learn by just reading. Furthermore, the learning of some subject domains such as

science and mathematics require active engagement of learners in visualising, simulating, exploring and practising. The print module by itself is insufficient as a tool for supporting such learning activities.

Based on the above analyses, it is thus clear that print modules do not contain the building blocks that support most of the principles of good practice. Therefore, effort should then be taken to devise a better learning tool which capitalises on the strengths of the print modules and at the same time eliminate the inherent weaknesses that exist in print modules.

In March, 1987, Chickering and Gamson (1987) introduced the "seven principles of good practice in undergraduate education" based on a thorough meta-analysis of 50 years of research on good teaching principles. These seven principles are general principles that can be applied to any learning environment. Since their introduction, the seven principles have been widely adopted and practiced in higher institutions of learning throughout the United States and Canada (Chickering and Ehrmann, 1996). These seven principles are as follows:

1. Encourages contact between students and faculty
2. Develops reciprocity and cooperation among students
3. Encourages active learning
4. Provides prompt feedback
5. Emphasizes time on task
6. Communicates high expectations; and
7. Respects diverse talents and ways of learning

The seven principles were introduced during the time when technology in education was at its infancy stage. In fact, the notion of ODL using web-based learning system during those days had not existed yet. Today, the advancement of Internet technology has greatly expanded the paradigm of learning. Learning with technology is a becoming as important as traditional mode of learning. The principles of good practice however, are still as relevant as they were more than two decades ago. Chickering and Ehrmann (1996) posit that appropriate use of technology with suitable instructional design could also help in advancing the seven principles of good practice. Concurring with their view, evaluation instrument for OUM's web-based HTML modules was carefully designed to ensure their adherence to the principles of good practice.

It is interesting to analyse how applicable these principles are when the print module is the agent that drives the learning process. The print module is basically a text-based learning resource that is non-interactive. Learning using the print module is a high personalised activity which does not involve interaction with others. Such activity inherently discourages interaction, reciprocity and cooperation among learners. Due to its non-interactivity, it is virtually impossible to create assessment activities that provide true real-time feedback. Furthermore, due to the linearity of the content, it is not easy to structure the content to

accommodate learners of different abilities and styles. In short, if self-managed learning is carried out using print modules, it is difficult to adhere to most of the principles of good practice.

Mukawa (2006) conducted a study to investigate the relationship between the seven principles of good practice and the effectiveness of online instruction. A meta-analysis on research findings drawn from 232 studies reveals that effective online instruction adheres to most of the seven principles advocated by American Association of Higher Education. Based on Mukawa's analysis, it is thus reasonable for us to use the seven principles as a guide in designing our instrument for conducting learner evaluation of the web-based HTML modules.

Mccombs & Vakili (2005) presented a learner-centred framework for designing e-learning environment. The framework was based on the the American Psychological Association's (1997) 14 research-validated Learner-Centred Psychological Principles. It is important to note that the 14 principles were categorised into 4 important factors that promote effective learning. These 4 factors are: the cognitive and meta-cognitive factors, motivational and affective factors, developmental and social factors, and individual difference factors. It needs to be highlighted that the major concern of any technological innovation in the field of education should be about the quality of learning. Thus the use of technology should enable a shift from the passive learning with print modules to highly interactive learner-centred learning. The creation of environments or tolls for such purpose should have the 4 factors taken into consideration. This certainly should include the design and development of the interactive web-based HTML modules.

At OUM, the web-based HTML modules reside in MyVLE, the University's online learning management system. The use of hypertext and hypermedia enables non-linearity in accessing its content. It also enables links to resources like interactive learning objects as well as resources on the Web. Being Internet-based, it has the potential to connect people. Interactivity can also be enhanced if appropriate learning objects are developed. Thus, the seven principles of good practice may be achievable in the web-based HTML modules, which otherwise cannot be achieved via the use of print modules.

Learning systems today have the necessary technology to create highly interactive learning environments. However, many hypermedia learning systems focus more on the content rather than the instructional design principles. As a result they fail to promote effective and enjoyable learning. To ensure the quality of an online learning system or tool before its full implementation, it is necessary to establish an appropriate framework for the evaluation of the system or the tool design.

Distinguishing learning preference from learning styles, Daniel, Matheos & McCalla (2004) defined learning preference as “the conditions in which learners prefer to work and learn independently, in collaboration with others and with the help or without the help of an instructor”. They also identify four kinds of learning preferences, independent, collaborative, instructor-centred and technology centred. The design of any web-based learning environment needs to take all these factors into consideration. Instructional designers always need to be aware that learners have their own preferred ways of learning. Some have the ability to learn without much help from the others. However, some students often prefer to work collaboratively with peers. There are also others who often need to seek guidance from the facilitators. An even more important factor to consider is that ODL learners are made up of adult learners who have varying abilities and learning needs. As such, it is necessary for them to have the flexibility to learn at their own pace and in the way they like most.

Before the HTML modules are to be implemented extensively, its efficacy as a tool for self-managed learning should be evaluated. Examining the various functionalities of the HTML modules from the theoretical perspectives determines the extent of its compliance to the fundamental principles of quality of an online learning tool. It needs however to be stressed that compliance to the basic principles of a good online learning tool by itself is insufficient to determine its effectiveness to learning in actual setting. Therefore, it is necessary to carry out trial runs for the purpose of user evaluation. This provides an opportunity to ascertain that the tool or system is well developed as an instructional media (Quilter and Weber, 2004).

Elissavet & Economides (2003) designed an instrument for hypermedia courseware evaluation. The design of the instrument was based on a thorough review of the issues emerged from research on instructional design and learning systems evaluation. The instrument focuses on four main areas: content, content organization and presentation, technical support and evaluation of learning. Items placed under content organization and presentation emphasizes on two major aspects of evaluation: pedagogical aspect and design aspect. The 100 item instrument and the additional 24 items catered specifically for web-based hypermedia courseware serve as an excellent source of reference for the design of the customized evaluation instrument for the web-based HTML modules developed by OUM.

Methodology

Evaluation of the web-based HTML modules was carried out in two phases. The first phase of the study was aimed at finding out the extent to which the HTML modules developed comply with the elements that facilitate effective learning from the theoretical perspectives. This phase of the study began with the design of an instrument which consists of 24 items.

During the first phase, evaluation was carried out by the research team members to look specifically into the availability of elements that promote learning, from the theoretical perspectives. These are elements that:

- Promote faculty-learners contact and cooperation
- Promote active learning
- Provide assessment of learning
- Communicate learning outcomes and high expectations
- Allow diverse talents and ways of learning
- Provide adequate learning support

The distribution of items according to the elements is shown in Table 1.

Table 1

Items Measuring Availability of Elements that Foster Learning

Elements	Items	Number of Items
(E1) Promote faculty-learners contact and cooperation	▪ Do the HTML modules allow synchronous communication? ▪ Do the HTML modules allow asynchronous communication? ▪ Do the HTML modules provide common platform for idea sharing? ▪ Do the HMTL modules include tasks or activities that require idea sharing?	4
(E2) Promote active learning	▪ Do the HTML modules allow non-linear access? ▪ Are the HTML modules linked to interactive learning objects? ▪ Are the HTML modules linked to the learning objects at appropriate nodes or links? ▪ Are the HTML modules linked to external web-resources at appropriate nodes or links?	4
(E3) Provide assessment of learning	▪ Do the HTML modules provide self-assessment activities? ▪ Do the self-assessment activities (if any) provide immediate feedback upon input? ▪ Do the HTML modules allow users to keep track of their own performance record? ▪ Do the HTML modules allow faculty to keep track of learners' performance record?	4

(E4) Communicate learning outcomes and high expectations	▪ Are the learning objectives specified in the HTML modules? ▪ Are learning outcomes provided at the beginning of every unit of learning? ▪ Do the HTML modules keep track of the total learning time of the user? ▪ Do the HTML module learning activities include a timer function (to set limit for response time)?	4
(E5) Allow diverse talents and ways of learning	▪ Do the HTML modules provide different learning paths based on different abilities? ▪ Do the HTML modules provide learning activities at varying levels of difficulty? ▪ Do the HTML modules allow Learners to learn at different pace and time? ▪ Do the HTML modules provide different links to external resources fro different group of Learners?	4
(E6) Provide adequate learning support	▪ Are learning guides provided for using the HTML modules? ▪ Are the learners provided with guides to derive at a solution if they consistently fail to answer a question? ▪ Are there hints provided when Learners fail to answer a question? ▪ Do the HTML modules or the system they reside in provide helpdesk services?	4
TOTAL		24

Group evaluation of the web-based HTML modules using the instrument was carried out by the four research team members. The task of the team members was just to inspect the modules to determine whether the listed elements are available. Two CiDT instructional designers who were involved in the development of the modules were requested to assist when there were uncertainties regarding the existence of specific elements. This was to ensure that the evaluation process was conducted objectively and without any bias. Ten modules were selected for inspection. The sampling method was purposive and based on the information from CiDT that those selected are representative of the HMTL modules that CiDT desires to produce.

The second phase focused on evaluation of the web-based HTML modules by users, both learners and tutors. User Evaluation of the web-based HTML modules is necessary to assess its effectiveness as a better alternative for the print modules as they are the main stakeholders.

The instrument designed for user evaluation of the web-based HTML modules is a set of questionnaire containing 40 close-ended items and two open-ended items. In designing the questionnaire, the principles of good practices (Chickering and Ehrmann, 1996) served as a guide. The adequacy of the web-based HTML modules as an online learning tool is viewed from four major dimensions, the technical adequacy, the interface design adequacy, the learner-support adequacy and the instructional adequacy. The 40 close-ended items are categorised in Table 2.

Table 2

Categories and Scope of Evaluation

Categories of Evaluation	Scope of Evaluation	Number of Items
Technical Adequacy	Reliability and ease of use	7
Interface design adequacy	Appropriate design of layout, colour and text	4
Learner-support Adequacy	Adequacy in terms of support to facilitate information search and carry out learning process	7
Instructional Adequacy	Adequacy of the tool to promote effective learning	22

All the 40 close-ended items were designed to be rated on a four-point Likert scale where

1 = strongly disagree
2 = disagree
3 = agree
4 = strongly agree

The purpose of using four-point instead of the commonly used five-point Likert scale is to prevent users from selecting the “Not Sure” or “Undecided” option. The instrument also includes two open-ended items. The first item “What are your main problems in using the html module” is for the purpose of identifying problems encountered in using the web-based HTML modules by gathering feedbacks from the users. The second item “Please give suggestions on how we can improve the web-based HTML module” is for the purpose of collecting opinions from the users on how the HTML modules could be improved

The research was conducted in the form of a survey. The sets of questionnaires were sent to various OUM learning centres throughout Malaysia, and administered from September to December 2010. The sets of questionnaire were distributed to OUM learners who used web-based HTML modules for their self-managed learning of the following subjects:

OUMH1103 – Learning Skills for Open and Distance Learners
OUMH1203 – English for Written Communication
OUMH1303 – English for Oral Communication

These three subjects were selected mainly because they are compulsory for Learners who pursue degree courses at OUM. Thus it was more likely for the researchers to gather a bigger sample for the purpose of quantitative analysis. Another reason is that the web-based HTML modules for these three subjects are among the web-based HTML modules inspected in the first phase of the study.

Convenient sampling was adopted for the purpose of data collection. The questionnaires were distributed to learners during the 3rd tutorial session. During the fifth tutorial session, the filled sets of questionnaires returned by the learners were collected. Subsequently, analyses were carried out on the sets of questionnaires returned. Forms which were incompletely filled were discarded.

A total of 860 sets of filled questionnaire were collected from OUM's various learning centres. Of these, 21 sets which did not have complete answers to all the close-ended items were excluded in the analysis.

Before the actual data analyses were carried out on the data collected, the research team carried out a computation of Cronbach's alpha on the items used to evaluate each category of adequacy. The purpose was to ensure that the items within each category are internally consistent. The results are summarised in Table 3.

Table 3

Cronbach's alpha for Items Measuring Adequacies

Adequacy Measure	No of items	Cronbach's alpha
Technical Adequacy	7	.916
Interface-Design Adequacy	4	.871
Learner-Support Adequacy	7	.922
Instructional Adequacy	22	.952

From the result, it is clear that the Cronbach's alphas for items measuring the four aspects of adequacies range from .871 to .952, indicating that the items for the measurement of respective adequacies have reasonably high internal consistency.

Data Analyses

The data analyses are aimed at answering the research questions. Research question 1 is “To what extent do the web-based HTML modules comply with the elements that facilitate learning from the theoretical perspective?”. The results are summarised in Table 4.

Table 4

Missing Elements for Effective Online Learning with web-based HTML Modules

Elements	Number of Items	Number of Non-Compliance	Non-Compliance Items
(E1) Promoting faculty-learners contact and cooperation	4	2	▪ Do the HTML modules allow synchronous communication? ▪ Do the HMTL modules include tasks or activities that require idea sharing?
(E2) Promoting active learning	4	2	▪ Are the HTML modules linked to the learning objects at appropriate nodes or links? ▪ Are the HTML modules linked to external web-resources at appropriate nodes or links?
(E3) Provide assessment of learning	4	1	▪ Do the HTML modules allow faculty to keep track of Learners’ performance record?
(E4) Communicate learning outcomes and high expectations	4	1	▪ Do the HTML modules keep track of the total learning time of the user?
(E5) Allow diverse talents and ways of learning	4	3	▪ Do the HTML modules provide different learning paths based on different abilities? ▪ Do the HTML modules provide learning activities at varying levels of difficulty? ▪ Do the HTML modules provide different links to external resources from different group of Learners?

(E6) Provide adequate learning support	4	2	▪ Are the learners provided with guides to derive at a solution if they consistently fail to answer a question? ▪ Are there hints provided when Learners fail to answer a question?
TOTAL	24	14	

Data needed for answering research questions (2) to (6) were collected in the second phase of the study through user evaluation survey of the HTML modules. Three modules were evaluated by 817 Learners and 22 tutors. Fig 1 and Fig 2 provide some information regarding modules evaluated by Learners and tutors.

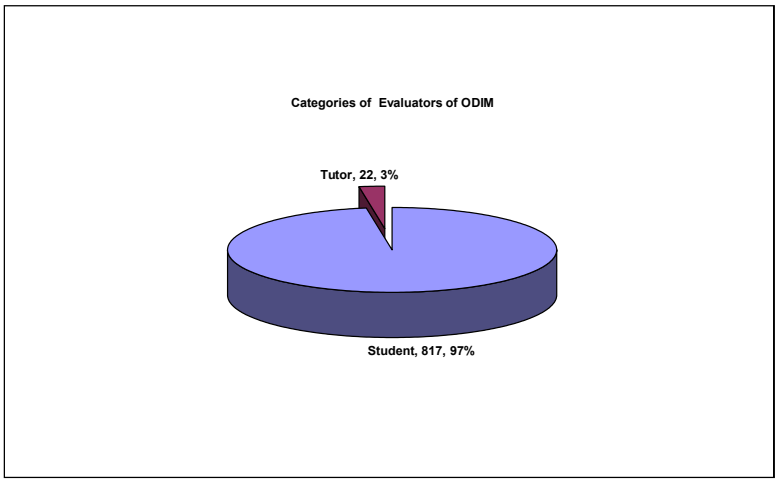

Figure 1. Distribution of Modules Evaluated by Learners

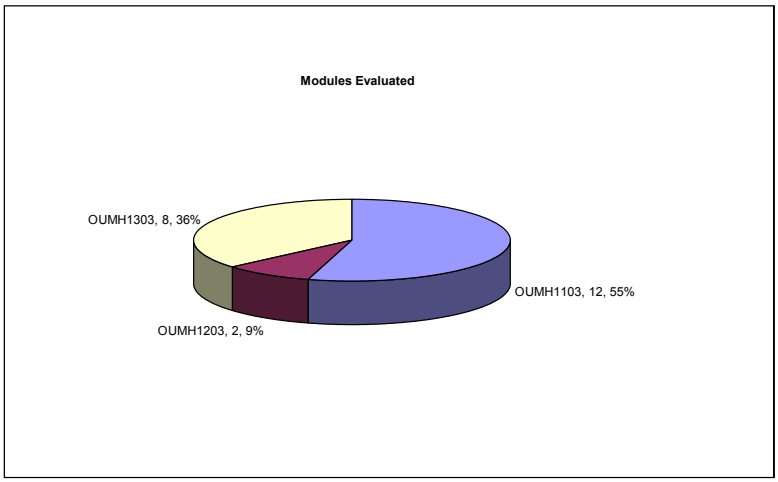

Figure 2. Distribution of Modules Evaluated by Tutors

The users of HTML modules comprise both the learners and the tutors. The profiles of the users are summarised in Table 5 and Table 6.

Table 5

The profiles of Evaluators (Learners)

Profile		Frequency	%
Sex	Female	491	60.1
	Male	326	39.9
	Total	**817**	**100**
Age	<21	42	5.1
	21-30	405	49.6
	31-40	279	34.1
	41-50	75	9.2
	51-60	14	1.7
	>60	2	0.2
	Total	**817**	**100**
ICT Competency	Very high competency	6	0.7
	High competency	52	6.4
	Average competency	488	59.7
	Low competency	214	26.2
	Very Low competency	57	7.0
	Total	**817**	**100**

Table 6

The profiles of Evaluators (Tutors)

Profile		Frequency	%
Sex	Female	13	59.1
	Male	9	40.9
	Total	**22**	**100**
Age	<21	0	0
	21-30	3	13.6
	31-40	7	31.8
	41-50	9	40.9
	51-60	3	13.6
	>60	0	0
	Total	**22**	**100**
ICT Competency	Very high competency	1	4.5
	High competency	1	4.5
	Average competency	5	22.7
	Low competency	13	59.1
	Very Low competency	2	9.1
	Total	**22**	**100**

Research questions (2) to (5) were aimed at investigating users' perceived quality of the web-based HTML modules from the technical adequacy perspective, the interface-design adequacy perspective, the learner-support adequacy and the instructional adequacy respectively. The result of the analyses are summarised in Table 7 and Table 8.

Table 7

Evaluation of Various Adequacies (by Learner Users)

Types of Adequacy	Gender	Mean	SD	N
Technical Adequacy	Male	3.14	.46	326
	Female	3.06	.54	491
	Total	3.07	.50	817
Interface-Design Adequacy	Male	3.15	.47	326
	Female	3.07	.50	491
	Total	3.09	.48	817
Learner-support Adequacy	Male	3.12	.49	326
	Female	3.02	.53	491
	Total	3.05	.51	817
Instructional Adequacy	Male	3.12	.44	326
	Female	3.04	.50	491
	Total	3.06	.47	817
Overall	Male	3.12	.49	326
	Female	3.01	.57	491
	Total	3.07	.45	817

Table 8

Evaluation of Various Adequacies (by Tutor Users)

Types of Adequacy	Gender	Mean	SD	N
Technical Adequacy	Male	3.50	.35	9
	Female	3.14	.33	13
	Total	3.29	.38	22
Interface-Design Adequacy	Male	3.56	.39	9
	Female	3.25	.38	13
	Total	3.38	.40	22
Learner-support Adequacy	Male	3.38	.33	9
	Female	3.22	.44	13
	Total	3.29	.39	22
Instructional Adequacy	Male	3.28	.38	9
	Female	3.13	.26	13
	Total	3.19	.31	22
Overall	Male	3.36	.26	9
	Female	3.16	.25	13
	Total	3.24	.27	22

Taking all evaluators into consideration, the mean rating scores for each category of adequacy and the overall rating of the web-based HTML module can be summarised in Table 9.

Table 9

Evaluation of Various Adequacies (by All Users)

Types of Adequacy	Gender	Mean	SD	N
Technical Adequacy	Male	3.13	.44	335
	Female	3.05	.52	504
	Total	3.08	.49	839
Interface-Design Adequacy	Male	3.15	.46	335
	Female	3.06	.50	504
	Total	3.10	.48	839
Learner-support Adequacy	Male	3.11	.53	335
	Female	3.01	.48	504
	Total	3.05	.51	839
Instructional Adequacy	Male	3.11	.42	335
	Female	3.03	.49	504
	Total	3.07	.46	839
Overall	Male	3.12	.48	335
	Female	3.04	.40	504
	Total	3.06	.45	839

From the two Tables, it appears that the tutors give a higher rating (M=3.25, SD=.27) to the web-based HTML modules as compared to the Learners (M=3.06, SD=.55). However, due to the great difference in the sample sizes of learner evaluators (M=817) and tutor evaluators (M=22), it may not be meaningful to conduct a t-test to determine whether the mean rating by the tutors is truly significantly higher than the mean rating by Learners.

The mean rating score based on the feedback from all the respondents (Learners and tutors) is 3.07 with a standard deviation of .45. Information regarding overall mean rating (Learners and tutors) of all items categorised under each category of adequacy is presented in Fig. 3, Fig. 4, Fig. 5 and Fig. 6 respectively.

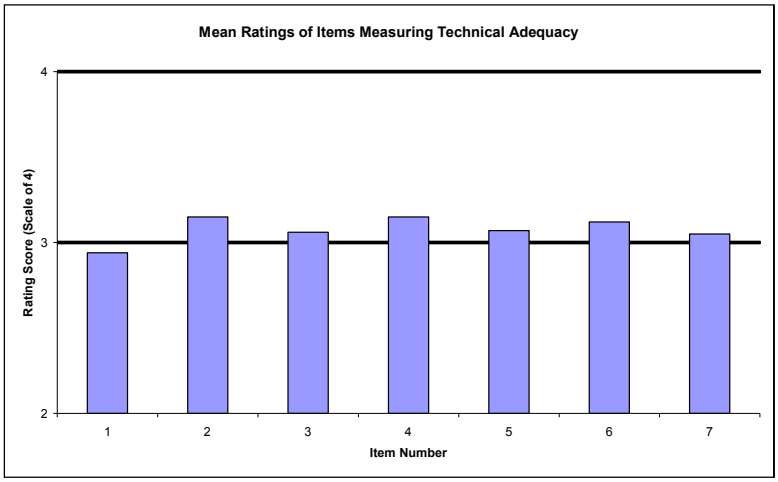

Figure 3. Mean Ratings of Items Measuring Technical Adequacy

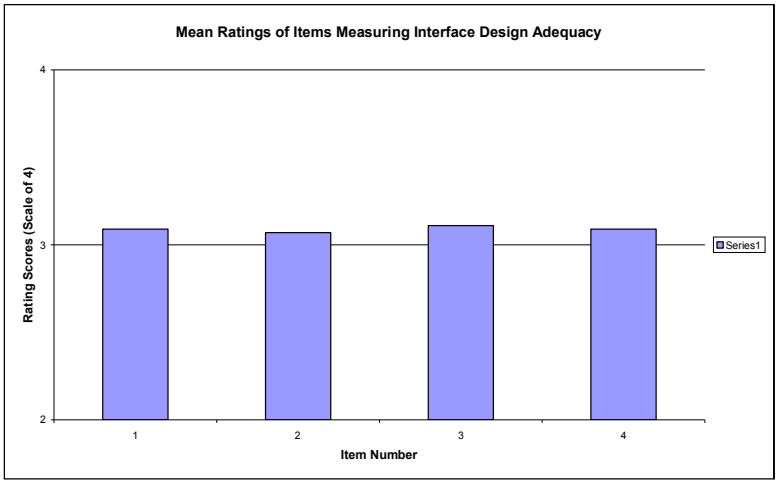

Figure 4. Mean Ratings of Items Measuring Interface-Design Adequacy

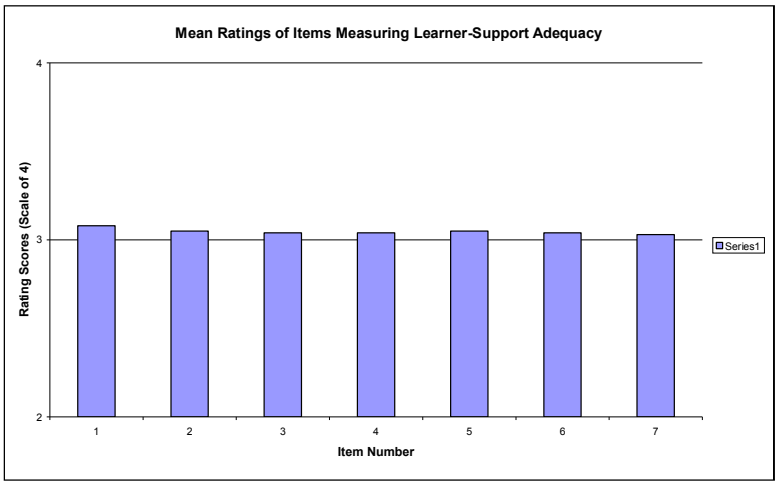

Figure 5. Mean Ratings of Items Measuring Learner-Support Adequacy

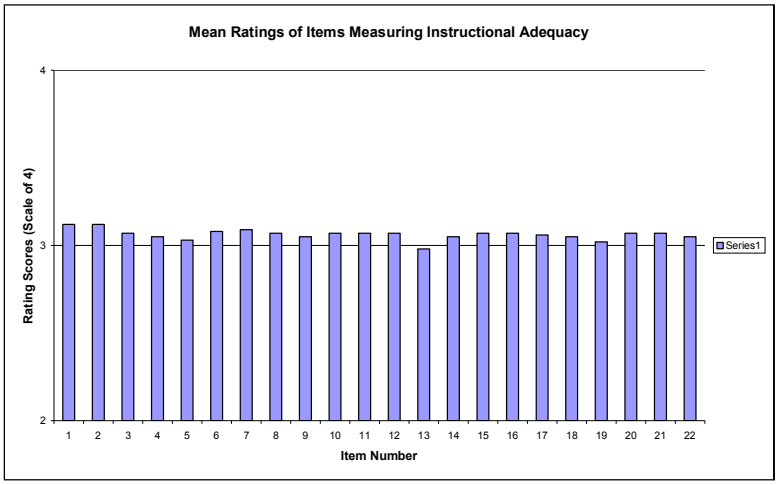

Figure 6. Mean Ratings of Items Measuring Instructional Adequacy

Research question (6) investigates whether there is a difference between male learners and female learners in their overall perceived quality of the web-based HTML modules. An independent sample t-test was conducted for the purpose.

The analysis shows that there is a significant difference in the rating scores the web-based HTML modules between the male learners (M=3.11, SD =.40) and the female learners (M=3.03, SD = .48); t(815)= -2.477 , p.=.01, d=0.20. The results suggest that gender factor does have an effect on the perceived adequacy of the web-based HTML modules. The perceived adequacy ratings by male Learners are higher than that by the female Learners. The Cohen's d value of 0.02 however, is indicative of a small effect size.

Research question (7) aims to investigate whether a learner's level of ICT competency has an effect on his/her perceived usefulness of the web-based

HTML modules. To determine the strength of correlation between the computer competency level and the overall rating of the learner on the quality of the web-based HTML modules, a Pearson product-moment correlation coefficient was computed. The result indicates that the there is significant correlation between the two variables ($r = .188$, $n = 817$, $p < .001$). The r^2 value of .035 however indicates that only 3.5% of the variance in the perceived quality of Technical Adequacy is accounted of by the variance in ICT competency.

There are two open-ended questions in the questionnaire. The first question was aimed at collecting feedback from the respondents regarding the problems faced when using the web-based HTML modules. Feedback obtained is summarised in Table 10.

Table 10

Problems Raised by Respondents

NO	Problems using the HTML Modules	Number of Respondents
1	There is difficulty to log in and launch the module.	34
2	The system appears to be slow	21
3	There is no face-to-face discussion	8
4	There is no one to explain the difficult concepts	8
5	We do not know when to use the learning objects	7
6	There are not enough self-assessment activities	3
7	It is tiring watching the computer for too long.	23

The second open-ended question was aimed at obtaining respondents' suggestions on ways to improve the HTML modules. Feedback is summarised in Table 11.

Table 11

Suggestions by Respondents

NO	Suggestions for Improvement	Number of Respondents
1	Should have more interactive activates and exercises	11
2	Face-to-face instruction is still important	10
3	The print module should also be given.	10

It is interesting to note that only two items from the 40 open-ended items have mean rating scores from learner users that are below 3.00. These two items are:

1. The HTML module can be launched without error (M=2.89, SD=0.610)
2. There are sufficient amount of activities in the HTML module to support learning (M=2. 92, SD=0.589)

Discussion of Findings

In this research, the efficacy of the web-based HTML modules as an online learning tool is evaluated from two main perspectives. The first perspective is the evaluation based on the theoretical principles. The second is the practical perspective of users' evaluation.

Theoretical Evaluation

Information provided in Table 4 indicates that the design of the web-based HTML modules has taken the various important elements of effective learning into consideration. It needs however to be noted that the capability of the HTML modules as an online learning tool has not been extended to the fullest. This will be discussed below:

E1: Promoting faculty-leaner contact and cooperation

Basically, the contents of the web-based HTML modules are just duplicates of the print modules. As such, they lack the elements that promote faculty-learner contact and cooperation (E1). There are no activities or tasks in the modules that encourage idea sharing. Besides that, it will be beneficial to set up subject-specific synchronous and asynchronous learning platforms which are directly linked to the modules. This would facilitate data and idea sharing and on top of that, promote faculty-learners and learners-learners contact.

E2: Promote active learning

The web-based HTML modules' hyperlink feature makes it possible for learners to access its content in a non-linear form. However, such capability have not been fully utilised to gain maximum benefits with respect to learning. Currently, learning objects are kept in the repository and not directly linked to the modules at appropriate content nodes. This creates dissociation between learning objects and the learning content. The learner may not be able to make good use of the learning objects to optimise learning. Effective use of nodes and links should focus on the following areas:

- Linking keywords or hypermedia to text, audio or video contents that illustrate or explain the concepts
- Linking keywords or hypermedia to external useful web-resources that help learners to understand better.
- Linking keywords or hypermedia directly to learning objects for learners to carry out learning via visualising, practising and interactive exploratory activities.

E3: Provide assessment of learning

The web-based HTML modules do provide assessment activities. However, it will be useful if the HTML modules include functionality to keep learners informed of their individual progress. For example, Learners would be more motivated to revisit the assessment activities if he or she knows that the system keeps track of his or her performance and gives an opportunity to improve his or her scores. It is also useful to include the functionality which keeps Faculty informed of the learner's performance when they carry out their self-assessment. With the information, the Faculty would then be able to identify and assist the learners in a more effective manner.

E4: Communicate learning outcomes and high expectations

Like print modules, the web-based HTML modules include learning objectives or learning outcomes at the beginning of every topic. However, to help learners keep focused on what he or she needs to learn, it would be beneficial if the intended learning outcomes for smaller units of learning are also specified. This should then be followed by appropriate assessment activities to gauge learning achievements.

Another functionality to be recommended is to set the limit for the response time in interactive activities. Another possible innovation is to have the functionality to compute scores based on the time spent in arriving at the correct answers. Such functionalities would encourage learners to optimise their learning time.

E5: Allow diverse talents and ways of learning

The web-based HTML modules evaluated appear to be lacking the elements that promote diverse talents and ways of learning. The content organisation and structure still adopts the behaviourist one-for-all approach. It needs to be noted that one of the attributes of computer technology that makes it an excellent tool to enhance learning is its interactive features. Such features should be capitalised in the building of an online learning environment that is "intelligent enough" to guide learning to the learning paths that suit him or her most. Interactivity by itself is not sufficient. It should be enhanced by diversity. Diversity

of activities enables learners of varying talents and styles to learn in the way they feel best.

E6: Provide adequate learning support

The web-based HTML modules evaluated do have some support features to help learners. But the support is in the form of guides for using the modules. What is lacking is the support needed in the learning of the subject matter. For example, assessment exercises do not provide hints or feedback that would help learners to understand better and guide them to derive at the correct answer to the question asked.

Evaluation by Users

From Table 9, it is clear that the mean rating scores for Technical Adequacy (M=3.08, SD=.49), Interface-Design Adequacy (M=3.10, SD=.48), Learner-Support Adequacy (M=3.05, SD=.51) and Instructional Adequacy (M=3.07, SD= .46) all exceed 3.00. This indicates the general acceptance of the users of the web-based HTML modules as an online tool for self-managed learning.

It was however mentioned earlier that there were two items that had rating scores of below 3.00. The first of these two items reflects the technical problem in launching the web-based HTML modules. The finding is consistent with the problem raised by users that they had difficulty in launching the HTML modules or that the system was slow. The low rating in relation to the launching of the HTML modules is probably not the result of the weakness of HTML module or MyVLE, but more likely due to bandwidth and Internet connection problem in some parts of the country.

The other item that has a rating below 3.00 should be a matter of concern. It indicates that the respondents prefer the web-based HTML modules to be equipped with more interactive activities and multimedia learning objects, and not just heavily based on text and static graphics or pictures. This argument is again substantiated by the suggestions from users that there should be more interactive activities and exercises. In fact, the interactive learning should serve as some kind of microworld that allows constructivist learning.

The t-test conducted to compare rating scores of the web-based HTML modules by male learners and female learners indicate that the male Learners give a significantly higher rating. This is probably a factor of gender difference, but the small magnitude of the difference should not be a matter of concern.

Another issue that needs to be seriously looked into are the other two suggestions forwarded by the users. These suggestions are:

1. there should still be face-to-face interaction
2. the print modules should still be given

The request by users to have face-to-face instruction indicates that there is still a gap between conventional learning and the ODL form of learning. It may not be possible to fill the gap, but it is certainly not impossible to narrow the gap. For instance, relevant video-recorded mini lectures (which are named as i-lectures by OUM) may be embedded and linked to the web-based HTML modules at appropriate nodes to allow the learners "see" the lecturer giving lectures. By using such mini-video-recorded lectures, we have the benefit of filtering off the unimportant content and select quality and concise lectures for our learners.

Recommendations

To summarise, the web-based HTML modules can be improved by considering the following factors:

1. Learning objects may be linked to the web-based HTML modules at appropriate nodes, not just placed at repositories and disassociated from the modules.

2. Instructional designers may have difficulty in determining the appropriate nodes to be linked to learning objects as this requires good understanding of the pedagogical and content knowledge of the subject matter. Therefore, the research team members are of the opinion that subject matter experts should be involved in the interactive content development.

3. To cater for learners of varying abilities and styles, it would be beneficial if the level of interactivity of learning objects linked to web-based HTML modules be enhanced in the following ways:

    a. Allow exploratory learning;

    b. Provide different responses for different inputs; and

    c. Has varying levels of entry for different ability groups.

4. Assessment activities in the web-based HTML modules should not be just providing scores. It should be "intelligent" enough to provide different responses for different inputs. The responses should be meaningful in that they guide learning or provide guidance in problem solving

5. The web-based HTML modules should include the functionality to keep track of learners' performance in assessment as well as his or her performance as compared to the peers.

6. The academics should gather or produce a collection of good mini video lectures that are relevant to the subject content. These video lectures should be embedded and linked to the web-based HTML modules at appropriate nodes to enhance learning.

Revised Model: Web-Based Interactive Module (WebIM)

Based on the discussion earlier, a revised model of the HTML modules is proposed. The revised model is named OUM's web-based interactive module (WeBIM) to draw attention to the emphasis on its interactivity. It is strongly believed that the feature that makes the digital modules much more superior than the print modules is its interactivity. Interactivity in OUM should focus on the following aspects:

1. to establish the cohesiveness between related contents
2. to link content to learning objects that enhance the understanding of the content
3. to provide interactive assessments that guide learning as well as to keep track of the learners' progress
4. To establish learning support by connecting learners to peers and facilitators, both synchronously and asynchronously.

A diagrammatic representation of the proposed model is shown in Figure 7.

The limitations in a printed module that could possibly be overcome or improved via the use of WeBIM include the following:

1. It allows both linear as well as non-linear access of course content
2. It allows process visualisation by supplementing textual explanation of a process with simulation of the actual process.
3. It allows inclusion of microworld for exploratory learning
4. It allows self-managed assessment with computer generated questions and assessment activities

Conclusion

The research project carried out to evaluate the web-based HTML modules is a small step that contributes to quality improvement of OUM's learning tolls and system. It is hoped that the research findings could serve as a guide or reference for the instructional designers and the academics of OUM to further improve the web-based HTML modules so as to make it more interactive, more user-friendly and most important of all, more effective as a tool for self-managed learning.

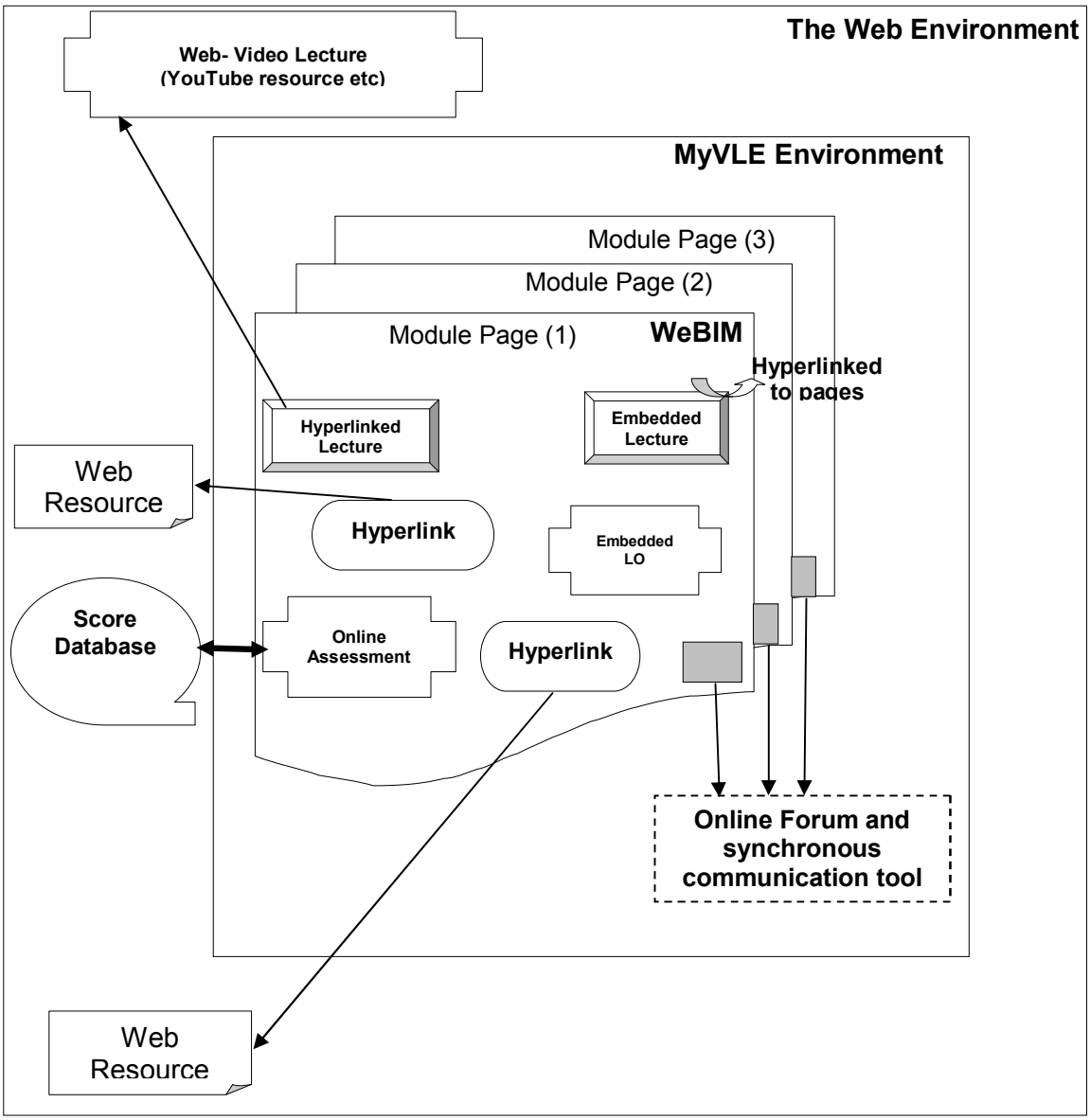

Figure7. Diagrammatic representation of WeBIM

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APPENDIX 1
Evaluation Forms for Phase 1 Evaluation
(Evaluation by Research Team Members)

(E1) Promoting Faculty-Learners Contact and Cooperation

Question No.	ITEM	CODE	RESPONSE	
			YES	NO
1	Do the Web-based HTML modules allow synchronous communication?			
2	Do the Web-based HTML modules allow asynchronous communication?			
3	Do the HTML modules provide common platform for idea sharing?			
4	Do the HTML modules include task questions or activities that require idea sharing?			

(E2) Promote Active Learning

Question No.	ITEM	CODE	RESPONSE	
			YES	NO
5	Do the HTML modules allow non-linear access?			
6	Are the HTML modules linked to interactive learning objects?			
7	Are the HTML modules linked to external web-resources at appropriate nodes or links?			
8	Can the module generate varying responses based on the inputs?			

(E3) Provide Assessment of Learning

Question No.	ITEM	CODE	RESPONSE	
			YES	NO
10	Does ODOM include self-assessment activities?			
9	Do the HTML modules provide self-assessment activities?			
10	Do the self-assessment activities (if any) provide immediate feedback upon input?			
11	Do the HTML modules allow users to keep track of their own performance record?			
12	Do the HTML modules allow faculty to keep track of learners' performance record?			

(E4) Communicates Learning Outcomes and High Expectations

Question No.	ITEM	CODE	RESPONSE	
			YES	NO
13	Are the learning objectives specified in the HTML modules?			
14	Are learning outcomes provided at the beginning of every unit of learning?			
15	Do the HTML modules keep track of the total learning time of the user?			
16	Do the HTML module learning activities include a timer function (to set limit for response time)?			

(E5) Allow diverse talents and ways of learning

Question No.	ITEM	CODE	RESPONSE	
			YES	NO
17	Do the HTML modules provide different learning paths based on different abilities?			
18	Do the HTML modules provide learning activities at varying levels of difficulty?			
19	Do the HTML modules allow Learners to learn at different pace and time?			
20	Do the HTML modules provide different links to external resources fro different group of learners?			

(E6) Provide Adequate Learning Support

Question No.	ITEM	CODE	RESPONSE	
			YES	NO
21	Are learning guides provided for using the HTML modules?			
22	Are the learners provided with guides to derive at a solution if they consistently fail to answer a question?			
23	Are there hints provided when Learners fail to answer a question?			
24	Do the HTML modules or the system they reside in provide helpdesk services?			

APPENDIX 2
Questionnaire for Phase 2 Evaluation
(Evaluation by Users)

OUM"S WEB_BASED HTML MODULE EVALUATION PROJECT

Dear Respondent,

We are seeking your assistance to participate as a respondent in our research project to study the efficacy of OUM's Web-Based HTML Modules for the purpose of learning. This research is funded internally by Open University Malaysia's research grant. Together with this letter is a set of questionnaire with items that ask a variety of questions about the HTML Modules. Please complete the form and return it to us upon completion.

Through your participation, we hope to identify the strengths and weaknesses of web-based HTML module. The results of this survey will help us to identify ways and means to improve the HTML module, as part of our efforts to provide a better virtual learning environment for OUM's learners.

We promise that all personal information provided will be treated with high confidentially, and we assure you that all responses will not be identified with the respondents personally.

WEB-BASED HTML MODULES EVALUATION FORM

PART 1: MODULE INFORMATION

Please write the Title and the Code for the module that you are evaluating

--- ---

(Module Title) (Module Code)

PART 2: USER INFORMATION

Please put a √ at the appropriate box

1. Are you male or female?

   □ Female □ Male

2. Are you a tutor/facilitator or a student?

   □ Tutor/Facilitator □ Student

3. How old are you?

   □ < 21 years old
   □ 21 – 30 years old
   □ 31 – 40 years old
   □ 41 – 50 years old
   □ 51 – 60 years old
   □ > 60 years old

4. What is your level of competence as a computer user?

   □ Very high
   □ High
   □ Average
   □ Low
   □ Very low

5. What is your level of competence as a MyVLE user?

- ☐ Very high
- ☐ High
- ☐ Average
- ☐ Low
- ☐ Very low

PART 3: OUM'S DIGITAL ONLINE MODULE EVALUATION

Please rank the questions based on the scale provided

1 = strongly Disagree 2 = Disagree 3 = Agree 4 = Strongly Agree NA = Not Applicable

NA = Not Applicable

TECHNICAL ADEQUACY

No	Items	1	2	3	4	NA	Comments
1	The digital module can be launched consistently without error						
2	The digital module allows me to navigate freely and select the content I want to learn						
3	The response time needed to navigate from point to point is reasonable						
4	I can easily exit from the digital module whenever I want to						
5	I can easily return to my last exit point of the digital module						
6	Using the digital module, it is easy to keep track of my learning						
7	There is no difficulty in using the digital module						

INTERFACE DESIGN ADEQUACY

No	Items	1	2	3	4	NA	Comments
8	There is clear contrast between text and background						
9	The overall layout of the digital module is appropriate for the intended audience						
10	Colour is used effectively throughout the digital module						
11	The text fonts used are appropriate throughout the digital module						

LEARNER SUPPORT ADEQUACY

No	Items	1	2	3	4	NA	Comments
12	The digital module is user friendly						
13	Instructions and guidelines on the use of the digital module are clear and adequate						
14	The hyperlinks help me to search for information within the module easily						
15	The module provides adequate links to external resources						
16	I can keep track of my own progress in the module						
17	The digital module allows me to communicate with my peers when I need help						
18	The digital module allows me to communicate with my tutor when I need help						

INSTRUCTIONAL ADEQUACY

No	Items	1	2	3	4	NA	Comments
19	Learning objectives are clearly stated in the module						
20	Module outlines are clearly shown						
21	The module specifies the pre-requisites needed for learning the topics						
22	The digital module stimulates my interest in learning the subject						
23	The digital module is highly interactive						
24	Assessment activities in the digital module match the learning objectives						
25	The assessment activities in the module are appropriate for me						
26	Learning activities in the digital module are useful for understanding of the subject						
27	The learning activities provides appropriate feedback for my responses						
28	The learning activities in the digital module cater for students of different learning abilities						
29	The learning activities in the digital module enhance my thinking skills						

No	Items	1	2	3	4	NA	Comments
30	Using the digital module, I can control my own learning pace						
31	There are sufficient amount of activities in the digital module to support learning						
32	All the important keywords are hyperlinked to their definitions and explanation						
33	The contents are organised in a systematic logical manner						
34	The presentation of the content is clear and understandable						
35	Images provided in the digital modules are useful for learning						
36	The graphics in the digital module are useful for learning						
37	Animations provided in the digital modules are useful for learning						
38	Assessment activities in the digital module are relevant to the content of the digital module						
39	Assessment activities in the digital module help me to identity my own weaknesses						
40	The digital module environment allows me to work collaboratively with my peers						

What are your main problems in using the digital module?

Problem 1: _____

Problem 2: _____

Problem 3: _____

Please give suggestions on how we can improve the digital module.

Suggestion 1: _____

Suggestion 2: _____

Suggestion 3: _____
