REFLECTIONS ON DESIGN FEATURES ADOPTED IN THE ONLINE COURSES OF MATE-I PROGRAMME

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Abstract

Using online methods for learning is rapidly growing among higher education institutions. Online learning is especially useful in open and distance learning (ODL) contexts, where opportunities for students to meet the instructors or to meet each others are frequently limited by time, distance or resources. By enabling access to a large range of resources, learning tools and communication facilities, online learning environments can effectively function in facilitating learners to construct their knowledge. However, in order to provide a meaningful learning to students, the online learning environments need to be well-designed.

The Department of Secondary and Tertiary Education of the Faculty of Education developed its first online course in Moodle, "Teacher Educator as an Educational Technologist", which is a course in the existing MA in Teacher Education -International (MATE-I) Programme. Subsequently, the remaining five courses of the Programme were also developed as online courses. A case study was conducted to investigate the design features adopted in these six online courses, with the aim of gaining useful insights to course developers, in identifying desirable features to incorporate as well as undesirable features to avoid, when designing and developing online courses.

Data collection was mainly done using a detailed checklist to study the design features of the online courses. Further, in-depth interviews were conducted with the course teams, focusing on their perceptions on the design features adopted, and the challenges faced by them. Results indicated that the design features of the courses mostly supported a constructivist learning approach. Even though there were many common features in the information design and instruction design, variations occurred in the interaction design and interface design. Some important features identified as desirable are, keeping the simplicity and consistency in design and navigation, structuring content in manageable amounts of information, provision of meaningful interactivity and visual presentation without distractions. Task focus was identified as a crucial design element. Designing interactive online learning environments grounded in pedagogy will be effective in encouraging knowledge construction by learners. Academics need adequate training, guidance, time, institutional support and appreciation, for online course design and development.

KEY WORDS: Online learning, Instructional design, Open and Distance Learning

Introduction

Innovative approaches such as use of Open and Distance Learning (ODL) and Information and Communication Technologies (ICT) are considered essential to replace the existing conventional approaches in professional development programmes for educators (Menon, 2004). ICTs are increasingly being used in adult continuing education programmes, as their potential to improve provision, widen access to learning, and help overcoming barriers such as time or distance has been recognized (Selvyn, 2003). Online learning environments can effectively facilitate distance learners to construct their knowledge by enabling access to a large range of resources, learning tools and communication facilities through the worldwide web. As such, using online methods for learning is rapidly growing among higher education institutions.

Being on par with the current developments in ICT in the country, the Open University of Sri Lanka (OUSL) has taken measures to integrate online teaching and learning into its various study programmes. Under the ADB funded Distance Education Modernisation Project (DEMP), many online courses have been designed and developed, using the Web-based Learning Management System, Moodle. The Department of Secondary and Tertiary Education of the Faculty of Education developed its first online course in Moodle, "Teacher Educator as an Educational Technologist", which is a course in the existing MA in Teacher Education - International (MATE-I) Programme. This was the first fully online ('Online-Plus') course offered via Moodle at the OUSL (Karunanayaka, 2008). Subsequently, the remaining five courses of the same Programme, "Teacher Educator as a teaching-learning specialist", "Teacher Educator as a curriculum developer", "Teacher Educator as a professional", "Teacher Educator as a manager and leader", and "Teacher Educator as a researcher", were also developed as online courses. This study aimed at investigating the design features adopted in these six online courses. It is expected that the study will provide useful insights to course developers, in identifying desirable features to incorporate as well as undesirable features to avoid, when designing and developing online courses.

Objectives

The objectives of the study are stated below.

1. To identify the design features in the online courses of MATE-I Programme developed at the Faculty of Education at the Open University of Sri Lanka
2. To find out the strategies adopted to enhance student interactivity
3. To find out the perceptions of teachers on the design features adopted by them

4. To identify the challenges faced by teachers when designing the online courses

Research issue and study framework

Any learning environment needs to be well-designed, in order to provide meaningful learning to students. Effective online learning will depend on appropriately designed learning experiences utilizing multiple instructional strategies, addressing different learner needs and learning styles. As such, course developers are faced with the challenge of creating innovative and effective online learning environments to enhance quality teaching and learning, utilizing the facilities available.

Since the World Wide Web provides a wide range of instructional facilities, a variety of design options are available for the instructional designers. The hypertext/hypermedia environment of the web allows instructional designers more flexibility and multi-dimensional ways of structuring information. However, designing and delivering instructions on the web requires 'thoughtful analysis and investigation of how to use the web's potential in concert with instructional design principles' (Ritchie & Hoffman, 1997). Thus, making decisions on appropriate design features appropriate in an online learning environment becomes an issue of concern, for online course developers.

Instructional Design (ID) as a process is defined as the systematic process of translating principles of learning and instruction into plans for instructional materials and activities (Smith & Ragan, 2005). Accordingly, ID can be thought of as a systematic way of improving the quality of instruction in various contexts, and its goal is to enhance student learning. Thus, course planning will rely on the developer's skills in ID.

As literature reveals, three main schools of thought- behaviourism, cognitivism and constructivism, have influenced ID approaches. These theories have been widely explored by educators to guide their instructional practices. Objectivist, behavioral learning theories as well as cognitivist information processing theories, suggest prescriptive instructional strategies, where directed instruction is provided to learners via units of information with reinforcement, resulting in the transfer of knowledge to learners (Skinner, 1968; Gagne, 1985). However, these approaches were considered inadequate when dealing with higher order cognitive skills such as analytical thinking and critical thinking. The constructivist theories have attempted to rectify this deficiency, by de-emphasizing instructing and supporting knowledge construction by learners, providing experiences in meaningful, authentic contexts, and encouraging collaborative learning (Jonassen, Peck & Wilson, 1999). Web-based instruction can facilitate the traditional directed learning approaches related to behaviourism, as well as cognitivist and constructivist approaches. However, it has been often argued that constructivist strategies are

more appropriate in a web environment (Naidu, 2003), and these have had a significant influence on ID.

Various models of online learning have been presented in the recent past, which provide guidelines to course developers. Presenting an instructional strategy framework for online learning environments based on various pedagogical theories and models, Johnson and Argon (2003) contend that powerful online learning environments need to contain a combination of seven principles: address individual differences, motivate students, avoid information overload, create a real-life context, encourage social interactions, provide hands-on activities and encourage student reflection. The 'Model of teaching and learning online' (Salmon, 2004) provides a five-stage framework to develop online courses- Access and Motivation, Online socialization, Information exchange, Knowledge construction and Development. Challenging this model which is designed to support a constructivist approach to learning, Moule (2007) argues that a variety of other e-learning approaches and the range of learning theories available have been ignored. In contrast, 'E-learning ladder model' (Moule, 2007), acknowledges a range of learning approaches starting with instructivist learning and moving towards constructivist learning. It presents a conceptual ladder of learning indicating how learning might be positioned as instructivist or constructivist levels, and reinforces the opportunity for blended learning.

Naidu (2003) discusses five main aspects to consider when designing online learning environments: presentation of subject matter content, activation of learning and engagement of learners with subject matter content, supporting interaction and socialization among students, assessing learning outcomes and providing feed back. The learning environment should be created to provide authentic learning experiences where facts are embedded in activities, rather than delivering facts, and focusing on arrangement of information, activities and resources. Further, creative use of multimedia to engage learners with subject matter, use of strategies to integrate collaborative learning practices among learners, use of online assessment strategies and providing effective feedback, are also important (Naidu, 2003). It is evident that all these imply the requirement of careful design.

Mishra (2001) presents a blueprint for designing online learning, highlighting the importance of pedagogical features considering the best practices of behaviorism /cognitivism /constructivism. It also indicates the need to make decisions on media delivery options and use appropriate media creation tools, basic interaction modes: learner-content, learner-teacher, learner-learner and methods of computer mediated communication: one-alone, one-to-one, one-to-many, many-to-many, use of alternative assessment strategies, development strategy, and learner responsibilities (Mishra, 2001).

Literature reveals several key design aspects to consider when developing online learning materials such as, information design, instruction design, interaction design and interface design. Some critical elements of designing online learning settings have been identified as, learning tasks (activities, problems, interactions used to engage the learners) learning resources (content and resources with the underpinning knowledge) and learning supports (schedules, structures, encouragements, motivations and assistances used to support learning (Oliver & Herrington, 2002).

It has been often claimed that interactivity is critical in online environments. Various studies describe strategies employed to enhance interactivity. Grabowski (2007) presented a framework adopted for selecting interactions based on three design assumptions: Quality time on task, effective instruction and active engagement. Collis and Moonen (2007) discuss a 'contributing student approach' where students actively contribute resources to develop the online environment. Online learning is considered better achieved through interactivity among the learners, rather than learning alone (Kawachi, 2003). This may be achieved through synchronous or asynchronous computer-based conferencing. Use of online discussion forums has been particularly identified as a valuable strategy to enhance interactivity among learners and thus collaborative learning, in distance education courses (Karunanayaka, 2009).

The literature reviewed clearly indicates that designing online learning environments requires a careful examination of the theoretical concepts underlying teaching and learning, and identifying appropriate instructional strategies to match the desired learning outcomes.

Methodology

This investigation was designed as a case study. The following six online courses designed and developed at the Department of Secondary and Tertiary Education, Faculty of Education at the Open University of Sri Lanka , were the units of analysis or the 'cases'.

- Teacher Educator as an Educational Technologist
- Teacher Educator as a Teaching-Learning Specialist
- Teacher Educator as a Curriculum Developer
- Teacher Educator as a Professional
- Teacher Educator as a Manager and Leader
- Teacher Educator as a Researcher

Data collection was mainly done using a detailed checklist to study the design features of the six online courses, specifically, the information, instruction,

interaction and interface designs. Information design was studied by observing the Home page information, organizing and structuring of the information and strategies used to present the information. Studying instruction design involved identifying whether features of a more teacher-centered (instructivist) or a more learner-centered (constructivist) approach were present. Interaction design focused on the use of hyperlinks for meaningful navigation to enable learner-content, learner-teacher and learner-learner and learner-interface, interactions. For interface design, attention was paid on the page layout, use of different fonts, colors, images and other media components.

In addition, semi-structured interviews were conducted with two members from each course team of the six courses. These interviews mainly focused on finding out their perceptions on the design features adopted, and the challenges faced by them during the design process of the online courses.

Findings and Discussion

Many common features were observed among the six courses in the information and instruction designs, yet variations were found in the interaction and interface designs. A summary of information design features observed are presented in Table 1.

Table 1 - Information design features

Feature	Details	Frequency (No. of courses)
Home Page Information	Informative title; Welcome; Introduction; Learning outcomes; User guidelines; Testing Computer; Ice-breaking activity; List of contents	06
	Contact information	04
	Copyright statement; Creation/Revision Date	00
Structuring of information	Organized consistently with time frame	06
	Sequenced Chunks -Topic/Task centred, Labeled	06
Strategies of presenting the information	Text files; PowerPoint presentations	06
	Web pages; Tables; Graphics	03
	Animations	01
	External Web links	04

Home page information was very similar in all six courses, consisting of an informative title, a welcome note, an introduction, learning outcomes, learner support, testing computer, ice-breaking activity and a list of contents with links. This was mainly due to the influence of a common template introduced at the

online course development training workshops. However, contact information was provided only in four courses, whereas none of the courses displayed a copyrights statement and a creation/revision date, which should be considered as important requirements.

In all courses, structuring of content was based on the pre-determined time frame of 24 weeks. Information was organized consistently as either topic-centered or task-centered chunks, in a sequential manner. Attempts were made to avoid information overload in pages by chunking information. Different strategies were used to present information, mainly, text-based readings and PowerPoint presentations. Two courses had used many PowerPoint presentations, rather than text. Strategies such as web-pages, tables and graphics were used only in three courses each. Information presented as web pages was observed to be more user-friendly, as learners could easily access desired sections through hyperlinked sub topics. Only in one course was there an animation to present some information in a motivating manner. Four courses had provided external web links, enabling learners to search for more information if necessary.

The instruction design was found to be very learner-centered in all six courses, since these were originally designed using a constructivist learning approach, Scenario-based learning (SBL), in the MATE-I programme. The course team members claimed that they were advantaged with this fact when transforming the existing print-based courses into online courses, since the learning scenarios and associated learning and assessment activities had been already developed. However, in addition to the existing offline learning activities, many new online learning activities had been introduced in all courses to enhance student interactivity. Many of these activities enhanced development of higher-order cognitive skills such as problem solving, analytical thinking and critical thinking, and the user had the control over his/her learning. Further, three courses had incorporated a reflective journal, which encouraged reflective learning among students. Table 2 presents a summary of instruction design features observed.

Table 2 - Instruction design features

Feature	Details	Frequency (No. of courses)
Pedagogical Design	A very learner-centred approach – SBL was used Learning Scenario; Many learning and assessment tasks; Learning resources and supports; Searching for information encouraged;	06
	Reflective journal	03

In contrast to information and instruction design, it was observed that interaction design varied within the six courses. The results related to interaction design are presented in Table 3.

Table 3 - Interaction Design

Feature	Details	Frequency (No. of courses)
Learner-Interface Interactions	Topics hyperlinked; Forward/backward arrows	06
	Hyperlinked icons	02
	Navigation panel in all pages	01
Learner-Content Interactions	Quizzes	06
	Animations	02
	Wiki	03
Learner-Teacher Interactions	Discussion Forum	06
	Instant Messaging	01
	E-mail link	03
Learner-Learner Interactions	Discussion Forum	06
	Instant Messaging	01
	E-mail link	03
	Chat	03

Use of hyperlinks for meaningful navigation was observed in all courses, yet in different ways. Hyperlinked topics and forward/backward links were the common strategies used in all six courses to facilitate learner-interface interaction, while hyperlinked icons were observed in two courses, which added variation. In one course, a navigation panel with linked subtopics appeared in all pages. This was identified as a very useful and a user-friendly feature as it provided the flexibility for learners to move to any section desired, from any page. Learner-content interaction was facilitated by different types of quizzes such as multiple choice questions, crossword puzzles and matching items, used in varied numbers (2-4) in all courses. The discussion forum was the most used strategy in all courses to encourage learner-teacher and learner-learner interactions, while very few (1-2) courses also included instant messaging, chat and wiki. Table 4 presents frequencies of different strategies adopted in each course to enhance interactivity.

Table 4 - Different strategies adopted to enhance interactivity

Strategy	ESP2240	ESP2241	ESP2242	ESP2243	ESP2244	ESP2245
Quizzes (MCQ/Crossword /Matching...)	07	06	04	03	04	07
Discussion Forum	10	04	07	05	06	10
Chat	-	03	-	-	-	-
Wiki	-	01	-	-	01	-
Virtual Canteen	01	02	02	01	01	01
Offline Activities	05	04	06	04	02	05
Total	23	20	19	13	14	23

All participants were of the view that these online strategies were incorporated to enhance active participation and collaborative learning among their students. However, in certain cases, the total number of activities (online and offline) presented to the learners within the 24 week time frame was found to be over 20. This is a matter of concern in relation to expected student workload during the specified time period. It would be desirable to have a balanced number of different types of activities that are manageable by the learners within the stipulated time.

When considering the interface design of the courses, it was revealed that the page layouts were generally similar. In all courses, either two or three frames have been used to organize and present the content. However, in many courses, unutilized space in frames was observed due to inappropriate organization of content within the frames. Further, in some cases, there were lengthy pages of information, where learners were required to scroll down and read from the screen with difficulty. As claimed by the participants, this had occurred mainly due to limitations in technical knowledge. Presentation of information as web pages, with a manageable amount of information in each page and having links to each section, allowing easy access to required sections, was available only in two courses. Table 5 presents a summary of interface design features observed.

Table 5 - Interface design features

Feature	Details	Frequency (No. of courses)
Page Layout	Consistent page layout; 2/3 frames	06
	Inappropriately organization of information	04
	Lengthy pages – requires scrolling down	04
	Short web pages with links to sections	02
Text	Appropriate font sizes/types/colour contrast	06
	Capitalization (All Caps) of fonts	02
	Bullets, Numbering, Icons, Borders	03
Colours	Appropriate Background colour; Contrast; Blend	04
	Overuse of colours- Distracting	02
Images/Graphics /Animations	Related to learning; Focus attention;	06
	Motivational	03
	Animated graphics used meaningfully	02
	Over-use of graphics	
Audio/Video	Audio clips	02
	Video Clips	01

Use of font types and sizes was generally appropriate and readable in all six courses. Yet, in three courses some font colors were not in contrast with the background color, and two courses had used capitalization of text in some instances, making it difficult to read from the screen. Strategies such as bullets, numbering, icons and borders to clearly present information were used only in three courses. In four courses, the use of background colors was blending, yet in two courses over-use of colors was observed, which could cause distraction. While motivational

graphics directly related to learning have been used in most cases, the over-use of graphics was observed in two courses. However, the use of animations and other media components such as audio and video was found to be very limited, with animations in three courses, audio clips in two courses and a video clip in one course. According to the participants, their main considerations in interface design were, to ensure user-friendliness, attractiveness, easy access to other components, simplicity and clarity. However, they claimed that the limitation in incorporating diverse media components such as animations, audio and video clips, was mainly due to time constraints and inadequacy in their technical skills.

The lengthy process of designing and developing online courses was perceived as a novel and an enjoyable experience by the participants. As academics in the field of Education, they were knowledgeable on theoretical aspects, and thus were aware of desired features of a learner-centered study material. Transforming courses that were already designed in print, using a very learner-centered approach was also identified as an advantageous factor, which reduced the development time of the online courses. Receiving guidance on online course development during a five-day training workshop and obtaining the technical support from a web/ multimedia developer were also found to be helpful, yet insufficient. Further, they had faced several challenges during the design and development process, mainly due to time constraints, technical issues with equipment and slow internet connection, and inadequacy in technological skills and training. Even though the participants were satisfied to some extent with the design features adopted by them in their first attempts in online course development, they all claimed that there should be many improvements in the future developments.

Conclusions and Suggestions

The study revealed that the design features in the six online courses of MATE-I Programme were mostly supporting a constructivist learning approach. Overall, a flexible approach was present where the users were encouraged to take control of their learning, with the facilitation of the teacher and technology. It confirmed the fact that constructivist models are more appropriate in an online learning environment (Naidu, 2003).

Among the courses, there were similarities within the information design and instruction design, yet differences occurred in the interaction design and interface design. Some important features identified as desirable are, keeping the simplicity and consistency in design and navigation, structuring content in manageable amounts of information, provision of meaningful interactivity and visual presentation without distractions.

A variety of strategies have been adopted to enhance student interactivity. Task focus is identified as a crucial design element, where challenging activities

should be provided to encourage exploration, discovery, collaboration, reflection and self-regulated learning yet deciding on the numbers and types of activities to incorporate within the time frame need to be carefully considered.

Perceptions of teachers revealed that their first attempt in online course development was a challenging, yet an interesting process, and that they were motivated to create improved online learning materials in the future.

Developing effective online learning materials is not a simple process of just transferring previous print-based materials to the web. The designers face the challenge of creating meaningful online learning environments, utilising web features effectively and paying attention to appropriate instructional design approaches. Designing interactive online learning environments grounded in pedagogy will be effective in encouraging knowledge construction by learners. Academics need adequate training, guidance, time, institutional support and appreciation, for the enhancement of future online course design and development.

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