

# Developing Internet-based Study Materials as Novice Web-designers: Experiences of Twelve Sri Lankan Teacher Educators

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**Abstract:** *The communication revolution has stimulated teacher education institutions in many countries in the world to integrate modern technology such as the Internet into their programmes. However, many issues arise in the transition from developing traditional text-based materials to Internet-based study materials. In particular, the difficulties faced by experienced educators in changing from conventional instructional approaches to Web-based instruction.*

*Initially the effects of limited knowledge and skills upon the development of instructional materials that made use of this new technology resulted in the development of limited educational strategies. However, as the experience levels rose, the design of learning experiences became more inventive.*

*This paper focuses on the experiences of twelve Sri Lankan teacher educators as they developed Internet-based study materials, while undergoing specialised postgraduate training at the University of Wollongong, Australia. As experienced teacher educators, yet novices to the Internet, each of them developed a Web study guide, targeting Sri Lankan teacher trainees.*

*The study analysed the ways in which the educators transformed information, the design pattern adopted, and the issues they faced.*

## Introduction

Rapid advances in educational technology are beginning to influence teaching and learning processes. Integration of information technology (IT) into education is currently a world wide trend, and specially, the Internet has been identified as a very powerful educational resource. Barron and Ivers (1996, p. 56) claim that the Internet 'empowers students to be independent learners, recognise relevant information, use technology when appropriate and communicate through multiple media'.

Teachers are considered crucial in the successful utilisation of technology in education, and the modern teacher has to cater for students who often are active users of the Internet. These students have grown up with the technologies of the Internet, and readily adapt to them, whereas teachers, in contrast, face difficulties in this transition (Bigum, 1998). The successful utilisation of technology in education will depend on how the teachers

are provided with the necessary training in technology-based teaching and learning competencies (Kimmel and Deek, 1996; Cornu, 1997).

Despite the tremendous advantages of the new technologies in teaching and learning, much of the literature reveal that in reality the progress is not so effective as expected (Underwood, 1997; Bork, 1995). Not only are teachers observed to be reluctant in using new technologies such as the Internet (Bigum, 1998), but University educators are also found to make little or no use of them (Collis, 1998a; Albright, 1996). As Collis (1998b) claims that 'there is a gap between vision and execution' due to various barriers confronting *change* in instructional practices.

Many authors agree that changing the conventional instructional approaches used by teachers is not an easy task, and a 'resistance to change' is noticed within the teaching profession (Underwood, 1997; Kennewell, 1997; Robinson, 1997).

Although some studies on technological integrations into schools and universities revealed that these approaches made a significant impact on educators (Woodrow *et al.*, 1997; Williams, 1997), it was also apparent in several other studies that teachers were just using the technology to substitute for their existing instructional approaches (Kennewell, 1997; Barrow and Laserna, 1997).

Underwood (1997) believe that teachers' practices become more stable over lengthy periods of time and maintaining the *status quo* becomes the norm. He suggested that, 'if change is to be brought about through experience, then that experience must not only be provocative, but it must be meaningful in both a personal and practical way to the teachers' (Underwood, 1997, p. 158).

Similarly, Collis (1998a) argued that University educators with many years of experiences in teaching might not be prepared to change their approaches. Like Underwood, she asserted that unless the instructors are convinced through a 'compelling motivation' change in instructional practices will not occur. Moreover, if instructors are pressured to change, the result would only be a superficial one.

As Visser and Jain (1997, p. 29) claimed that,

"Technology in and of itself does not change the world. Human beings do. They do so by using technologies in creative and critical ways, opening up important new opportunities to respond to existing and emerging problems. The challenge is there to be met."

For teachers to become effective change agents in this new environment, the teacher educators are expected to help them in this process (Robinson, 1997).

### **Teaching and Learning with the World Wide Web**

The WWW is increasingly being used as a medium for delivering instructions in the teaching and learning processes.

Web-based instruction (WBI)... utilises the attributes and resources of the World Wide Web to create a meaningful learning environment where learning is fostered and supported (Khan, 1997, p.6).

With its vast pool of resources and the hyperlinked environment that allows instant access to them, the WWW becomes a valuable tool for facilitating knowledge exploration by learners. Through making discoveries in this information-rich environment, learners can construct meaningful knowledge. Thus, the Web functions very well as a knowledge construction tool and when employed in the right pedagogical context, can in part become 'a cognitive tool' for effective manipulation of information (Jonassen, 1995; Jonassen, 1996; Jonassen, Peck and Wilson, 1999).

The potential of the Web as a massive information resource alone does not ensure a meaningful learning. Yet, the application of hypertext and hypermedia in the Web environment provide opportunities for learners to explore a problem in multiple ways and hence facilitate 'cognitive flexibility' (Spiro, Feltovich, Jacobson and Coulson, 1995).

As Brooks (1997, p. 28) asserts, 'The Web's greatest intrinsic power is that it encourages branched, non-linear instruction'. Although the Web has the potential to facilitate traditional directed learning approaches, Web-based learning becomes challenged, when the learning outcomes are considered (McMahon, 1997). This implies, that the ability of the Web to foster a 'meaningful learning' through 'knowledge construction' will not be accomplished, if it is only used to 'directly instruct' or 'teach' the learners.

Khan (1997) discusses a number of features associated with a Web-based learning environment, that makes it a unique medium of facilitating meaningful learning such as, flexibility, interactivity, collaborative learning, self-regulated learning, authentic learning and open learning.

Despite the advantages, several concern about Web-based learning have also been raised. These concerns are, either pedagogical issues related to teaching and learning, such as 'information overload' (Ryder and Hughes, 1997), navigation issues such as 'getting lost in hyperspace' (Khan, 1997), or technological issues related to hardware and software (Hill, 1997). Cross-cultural differences due to language, teaching and learning styles, and interaction and communication, may also affect the learners in a Web-based learning environment (Collis and Remmers, 1997).

### **Designing Web-based Learning Materials**

Khan (1997) contends that the Web has the potential to support well-designed instructional materials. However, the design and delivery of instruction via the Web requires 'thoughtful analysis and investigation of how to use the Web's potential in concert with instructional design (ID) principles' (Ritchie and Hoffman, 1997, p. 138).

Gros, Elen, Kerres, Merrienboer and Spector (1997) argue that models of ID provide a link between the learning theories and practical construction of instructional systems and 'bridge the gap between (instructional and learning) theory, and the development of powerful learning environments'. As such, ID models are neither purely theoretical nor purely practical (Gros *et al.*, 1997, p. 48).

Wilson and Cole (1996) observed that ID developed from a behaviorist foundation and then moved towards cognitive foundation, before applying a constructivist approach to

learning. It has been argued that constructivist models are more appropriate in a Web environment, rather than the behaviorist models (Jonassen *et al.*, 1999; McManus, 1996). McManus's (1996) hypermedia design model based on the cognitive flexibility theory is well-supported within a Web environment, as it provides learner-controlled access with the use of multiple paths. It emphasises case-based instruction and uses multiple cases to 'criss-cross the landscape' as suggested in the cognitive flexibility theory (Spiro *et al.*, 1995).

The features of WWW such as hypertext, graphics, sound and video, and the easy-to-use, point and click graphical interface provide an extensive environment for instructional designers to develop diverse types of learning materials. However, many authors agree that careful consideration and analysis is very important when designing a Web-based learning environment (Brooks, 1997; Khan, 1997; Ritchie and Hoffman, 1997).

Brooks (1997) identifies the processes involved in preparing Web-materials such as, 'Webifying' written materials, adding hypertext links, adding multimedia and online tutoring. These processes should be preceded by a planning stage, that includes developing goals and objectives according to the learner needs, deciding on content and developing appropriate activities and finally organising and arranging information.

However, several studies show that simply placing content on the Web does not result in student use of the Web for active learning or self-regulated learning, as intended by the instructors (Bostock, 1997; Ward and Newlands, 1998). Similarly, Dijkstra, Collis and Eseryel (1998) found that the students needed a 'push' or a reward' to acknowledge their participation in activities set out in their Web-based course. Hence, instructional designers face the challenge of creating motivational, interesting and productive web learning environments (Duchastel, 1997; Ritchie and Hoffman, 1997).

Starr (1997) identifies, hypertext, delivery of multimedia and high interactivity as three key features of a Web environment that are important to the designer, and suggests that 'the interface should incorporate human-computer interface design principles and not just transfer paper or previous non-graphical interfaces to the screen...' (p. 10). Similarly, Collis and Winnips (1997) declare that the design of effective web environment involves 'the integration of technical considerations and skills, user interface design, instructional design and management and organisational aspects'.

Several authors have recommended some important features to take into consideration when designing Web-based materials. These are mainly in the areas of organisation of information, orientation of the learner within the environment, navigation, interactivity and presentation. Keeping the simplicity and consistency in designing and navigation, structure text to establish coherence, provision of real interactivity, and visual presentation without distractions are some common aspects identified (Oliver, Herrington and Omari, 1996; Shotsberger, 1996; Starr, 1997; Brooks, 1997; Hedberg, Brown and Arrighi, 1997).

In the process of designing and producing instructional materials, the designers have to engage in deeper analysis and articulation of the content, and hence they are forced to reflect upon their knowledge in a new and a meaningful way. Hence, the designers function as learners. Following this, if the learners are empowered to design and produce

their own knowledge representations, or learners as designers, that would be a very powerful learning experience (Jonassen and Reeves, 1996, p. 695).

Moreover, Hedberg *et al.* (1997) argue that when the learners are producers, if the focus is on the development of the product, the cognitive load would be very high. With the focus on the learning process, 'less emphasis is placed on the refinement of production skills and more emphasis is placed on student initiated design and development with just-in-time support' (p. 49).

Gros *et al.* (1997) claim that the focus on 'realising a product, rather than on supporting learning' results in poor instruction, and this happens as a consequence of 'paying too much attention to less important characteristics' (p. 49). They also claim that previous experiences influence people when they are designing instruction.

...Consequently, novices at ID who rely on their classroom experiences, typically choose a rather static information delivery approach rather than a learning-support one. Presenting well-structured information in an attractive way gets focused upon, and ID is reduced to the design of mere surface characteristics (Gros *et al.*, 1997, p. 50).

Further, Gros *et al.* (1997) explain that although there may be some highly capable and reflective persons who might overcome this previous influence and design according to the context, this number is very limited.

According to Boer and Collis (1997), there are very few examples of efforts to engage all instructors in a faculty in using IT in their instructional practices. Describing an approach at the University of Twente, Netherlands, as one such instance, they explain how all instructors were involved in the redesign of their courses as Web-based environments, and recommend, 'building upon the instructional methods already familiar to the instructor', as a very useful strategy.

### **Background of the Study**

Sri Lanka is currently at the stage of integrating Internet-based teaching and learning into teacher education programmes. The recognition of the importance of educating teachers in the use of new technologies has influenced the teacher education institutions in Sri Lanka to focus upon this.

Under the World Bank sponsored Teacher Education and Teacher Deployment (TETD) Project, a number of teacher educators representing different teacher education institutions in Sri Lanka were awarded fellowships for staff development in overseas Universities, including The University of Wollongong, Australia.

The TETD Project also proposed to establish a computer network among the National teacher education institutions (SLTETD Project, 1996). In the near future teacher education programmes in Sri Lanka can be expected to have IT components integrated into them. It follows that it is important to enhance the competencies of teacher educators who will use IT.

### **Purpose and Significance of the Study**

The purpose of this study was to examine the design processes adopted by a group of Sri Lankan teacher educators, while they developed Internet-based study materials, as novice Web-designers.

During this process, each designer went through a unique experience where a transition from designing traditional text-based materials to Web-based materials occurred. The insights gained through this study provided an understanding of how the teacher educators transformed traditional text-based materials to Web-based materials and the problems they encountered in this process, as novice Web-designers.

Further, it was an opportunity to study specific design issues, associated within a Sri Lankan context. This would be a significant contribution, since Sri Lanka is currently at the preliminary stages of integrating Internet-based courses into higher education.

### **Limitations**

This investigation was limited to analysing experiences of a small group of twelve Sri Lankan teacher educators in their process of designing Internet-based study materials as novice Web-designers, while studying in Australia. These findings cannot be generalised to all teacher educators. However, the findings do contribute to a body of information on instructional design issues faced by educators, in developing Internet-based study materials.

### **Methods**

#### *Participants*

The participants were twelve instructors from different teacher education institutions in Sri Lanka, who were familiar with using, designing and developing text-based study materials. At the University of Wollongong, they were enrolled in the subject, Information Technology for Education and Training, as a component of their Master of Education Degree Course, in which they were required to develop a Web study guide (WSG).

They were experienced teacher educators consisting of four females and eight males, in the age range of 30-45 years. All have had more than ten years of experience in the teaching profession, either as teachers or teacher educators. Seven were B.Sc. graduates and the rest were B.A. or B.Ed. graduates. All were professionally qualified and six had Masters Degrees.

Most of them (8) have been involved in developing text-based study materials in Sri Lanka. Only three of the participants were competent in computer use, and only one person was familiar with Internet use. The others had very little or no experience in computer use and Internet use. None of them had designed or developed Web-based study materials before. At the University of Wollongong, three participants (who had prior computer experience) followed multiple IT subjects, majoring in IT for their Masters Degree, while the others followed only one IT subject, along with subjects

from other disciplines.

### ***Task***

The common IT subject followed by all the participants was, Information Technology in Education and Training, in which they had to design and develop a Web-based study guide on a topic of their own choice, as an assignment.

This is a basic IT subject which is mainly designed to prepare students to design, develop and evaluate teaching and learning materials using information technologies. Spread out in a thirteen week time frame, this subject included both face-to-face and online sessions, with many hands-on experiences. The development of a Web study guide (WSG) was the final project for this subject. According to the course instructors, the main purpose of this task was exposure and awareness. It included three key areas; developing skills in terms of the software, conceptualising in terms of the content, and creativity in terms of the designing and structuring.

This process took place in constructivist environment, where the learners created their own understanding of the process, through the experience of it (Jonassen, 1996). The emphasis on this task was mainly on the designing and understanding how to structure activities to deeply engage the learners. Hence, the skilling was de-emphasised. Only the basic skills on creating Web pages using Claris Home Page 3.0 were introduced at an initial workshop held in week 2. A collection of WSGs developed by previous students was provided as resources to be studied and reviewed. Another workshop to clarify the problems encountered while developing the WSGs, was held in week 10.

The students were encouraged to display their draft WSG and obtain feedback from peers and staff. In addition to the class discussion on common issues, individual assistance and guidance was provided by the instructors when required.

### ***Data Collection***

Data was gathered from multiple sources during the process. basic information of the participants was obtained via a preliminary questionnaire which was used to identify each participant's background information such as educational background, experience and subject specialisation. The course instructors were interviewed to find out about the course background, including the knowledge and skill development activities implemented as support to this task.

The participants were observed while they were building up their WSGs and preliminary interviews were held. These interviews made use of the WSGs to stimulate recall. The aim was to understand how they planned and progressed through the process of designing and developing their WSGs.

Both electronic and hard copies of the developed WSGs were analysed throughout the process, using a checklist. This enabled identifying the specific design approaches adopted by each participant during the development process. The preliminary analysis of observation, pre-interviews, and study materials helped in identifying some key surface themes. Final semi-structured interviews were held with the participants, in order to obtain further information and clarify previous information.

Reflective reports of the participants, journal writings of the researcher and other artifacts such as course outlines were also used as sources of data. In addition, informal class observations and discussions with the participants and the instructors were held throughout the process, to gain a clearer understanding of the whole process.

### ***Data Analysis***

Data analysis continued throughout the study, starting with first data collection. The preliminary observation and interview data were primarily coded and categorised while examining for identifiable patterns. As the study progressed, the codes were reformulated, categorised and sub-categorised. The final-interview transcripts were also initially coded using the same coding procedure, and they were further analysed. The reflective reports and other artifacts were used to triangulate data, which facilitated further analysis of results.

The data were finally organised under seven main categories: design patterns, planning methods, concerns, influences, issues, support and reflections.

The twelve participants' design processes were written as twelve separate cases, based on the above categories. They were carefully examined for similarities and differences, and the design patterns were identified.

## **Results and Discussion**

Results are discussed separately as the Process of design and development of the WSGs, and the Product or the developed WSGs.

### ***Process — Design and Development of WSGs***

#### **Planning methods**

In the planning stage of the task, the participants engaged mainly in defining a target group, selecting a topic, finding information and arranging information. All the participants identified either trainees, teacher educators or students in Sri Lanka as the target audience of their WSGs. Selection of a topic was based on the needs of their target group and it was mainly influenced by their professional and personal interest in a subject area.

Some of them selected specific topics directly from the Sri Lankan syllabi (eg. Cement Production, Flowering Plants, Mathematics Progression), while the others opted to develop on some new areas they have learnt in their subjects (eg. Reflective Practice, Clinical Supervision, Computer Mediated Communication). The main sources of information were library text resources and Sri Lankan text materials. Only four used Web resources.

All participants started arranging information by mapping out the content on paper first. Many of them demonstrated a procedure of progressing from the "known to unknown": writing down in paper, word processing, creating Web pages and copying



the content into it. This may be an attempt to reduce their cognitive load (Sweller, 1999).

### Concerns

It was apparent that all participants attempted to make use of this task to develop some material which would be relevant and meaningful in their current profession. Anura's remark, "This topic is a new concept, which is needed to be introduced to Sri Lankan Teachers", and Siri's remark, "As a teacher educator, I am familiar with this topic. I thought it is highly valuable for me, and my teacher trainees also" depict this attitude.

They were also concerned about gaining attention, retaining attention, motivating and facilitating the learners. All were concerned on developing their own knowledge and skills. Many were concerned on this task as an assessment, and attempted to improve the WSG to obtain a good mark.

### Influences

Numerous factors have influenced the participants at different stages in this process, mainly on selecting the topics, arranging information and inserting specific features in their WSGs. The arrangement and presentation was influenced by the participants' previous experiences, as evident by following quotes:

*I have many experiences as a teacher educator and a curriculum developer. I used those experiences mostly in developing this (Nimal)*

*I was mostly influenced by the experience in writing modules (Anoma)*

On the other hand, the previous WSGs were also influential. Anura's declaration, "I designed mainly by reviewing previous WSGs" was shared by many others at the beginning, but later on some features were changed according to their own interests.

However, Yamuna, Nimal and Karu claimed that they were not influenced from previous WSGs. Yamuna declared that she did not even look at the other WSGs until she developed hers. Epa tried to do something different because, at the beginning the course instructors have indicated that they did not expect something identical to previous WSGs.

Many were influenced by discussions with the course instructors who suggested changes to their WSG features such as, reducing the length of information and changing the activity type.

Learning theories and instructional models have also had an influence in the WSG presentations to some extent. Except for Epa and Karu who directly claimed they followed a constructivist approach, the others responded that they did not follow any specific model, but were influenced by Gagné's events of instruction, motivation theories and Bloom's taxonomy.

## Issues

At the beginning, some were not certain about the purpose of the task. Epa's remark, "I didn't quite realise what a WSG is", reflects this view.

Frustrations at the beginning were explained by Nalini as, "There were instances when I came to work, but couldn't proceed, and there was no one to get help from, and I had to stop and go home". Epa said, "I had to learn by mistakes". However, their desire to accomplish this task, motivated them to seek help from the instructors, peers or any others to solve their problems.

A few changed their topics, because they could not find relevant images and lacked the skills to create them. Epa had almost completed developing his WSG on Factorisation, but changed later when he realised that this topic was not appropriate to present as a WSG.

Many started with having a lot of information in the content at the beginning. However, after discussing with the instructors and learning more about WSG characteristics, many of them reduced the amount of information they originally planned to present.

Limited technical skills were found to be a major issue faced by all, and novice computer users were affected the most. A strategy adopted by a majority (8) of teacher educators was to buy their own PCs, install the software and practice at home. Many of them agreed that this self-practice, using mostly trial and error methods helped them immensely in building up their WSGs.

However, this strategy resulted in a cross-platform issue, as their WSGs would not work well in Macintosh computers in the laboratory. Later they could overcome this problem with the help of the instructors, but a lot of development time was wasted on re-linking and re-structuring, and many considered this to be the main issue they faced.

Time limitations, work stress and tension were common constraints faced by all. The initial workshop was held in week 2, and the task was due in week 13. However, most of them started planning and designing at a late stage, since all were occupied with many assignments in three simultaneous subjects. Once started, most of them claimed they spent more time on this assignment, since they were very interested in this new subject area.

In some cases, there were frustrations in being unable to implement their ideas on the WSG due to the lack of skills. For example, Anoma wanted to show the development process of cement using an animation, but could not do that.

## Support

The two workshops were useful for all. First workshop was useful to become familiar with the software, to start developing the WSG. Second workshop helped them to overcome the problems they encountered while developing the WSG.

All were supported by the instructors and some had personal consultations with them to clarify problems. However, many tended to obtain support from peers. The reluctance of

some to ask for help from instructors may be due to a cultural influence. On the other hand, the less technologically skilled people obtained help from more skilled people. Collaborative work played a key role in this process. Since all the participants were new to this subject area, they tended to discuss and share ideas on common issues. Other than the class discussions, small peer groups, for example people who were sharing the same house, people who were studying multiple IT subjects, or people from the same institution tended to group and discuss together.

The collaborative process not only led to the sharing of ideas, but also led to the sharing of resources. For instance, in some cases the same animated images were used by several persons in the group, and six people have shared the same external Web resource to link in their WSGs. This indicated a close peer relationship among small groups.

### Reflections

The attitudes of the participants were observed to change during this process on creating a WSG. At the beginning most of them were uncertain and not confident about developing a Web material, and comments such as, "I though I wouldn't be able to do this satisfactorily", or "I was very much worried and afraid thinking whether I would be able to manage this" were typical.

At the end of the process, all twelve participants were very satisfied and confident in developing Web-based study materials. Comments such as, "Now I think I can prepare any WSG" and "I have a confidence that now I can do this" have replaced the early comments. Gaining "hands-on" experiences in using the new technology, and the satisfaction of developing their own Web material, made a great impact on many, as well were novice Web designers.

Further, they were also very much motivated to use this experience in their profession, after going back to Sri Lanka, as reflected by Epa's comment, "Now I can contribute a lot to our distance education modules". They developed only limited skills in developing Web materials, using a single software. Yet, the impact of this process was so high that the confidence level was raised to a much higher level, from a very low starting level. They also wanted to practice and share their knowledge and skills after going back to Sri Lanka.

Even the participants who responded at the beginning that they did not intend to develop Web-based study materials after going back to Sri Lanka, had a completely different attitude at the end of the process. The following comments expressed by Lal summarises the ideas shared by most of them, at the end of the process.

*I never thought that I might have an opportunity to move forward with the new technology, during my working period... But now I have had an experience and I realise that these things can be done by us too.*

When asked whether there would be any change in their WSGs if they had to do this process again, all of the participants claimed that they intended to do so. Although most of them have presented their WSG following the traditional instructivist approach, several of them wanted to change their presentations to include more constructivist features.

such as changing the activity types and allowing the learners to explore more by linking many external Web sites as resources. Yet, a few did not want to change their instructional approach even in future productions, except for including more images and Web links. All the participants agreed that introducing WSGs or teacher education in Sri Lanka is a very useful and an effective methods of teaching and learning. They all expressed their motivation and desire to implement such activities, if they had the opportunity and the resources.

### **Product — Developed WSGs**

#### **Arrangement of information**

At the beginning, all participants identified some common basic components to be included in their WSGs, which were Overview/Introduction, Objectives, Topics/Sub topics, Activities, Feedback, Help, References/Resources. Many of them pointed out that there will not be much difference in their presentations from a text based study materials, in some cases from distance education (DE) materials, except for having less content, including more activities, changing the placement of activities, and inclusion of motivational features available in the Web environment.

However, during different stages of the process, several changes were made in their presentations. Whilst it was difficult to categorise the WSGs as instructivist or constructivist, the final versions of the WSGs displayed two distinct approaches in the arrangement and presentation of information. These were called, 'a traditional instructivist approach' and 'a less-traditional more-constructivist approach'.

Table 1 presents some examples of the characteristics observed in these two types of presentations.

**Table 1: Some examples of features observed in the two types of Web Study Guides**

<b>Features</b>	<b>WSGs having a traditional, instructivist approach</b>	<b>WSGs having a less-traditional, more-constructivist approach</b>
Presentation of Information	Lengthy descriptions	Brief descriptions
Learning Strategy used	Reading from screen and learn	Finding out information using the resources and learn
Learning Environment	Sequential order in presentation of topics.	No sequential order. Flexible environment.
Use of Activities	To recall or apply facts.	To engage users to build up learning.
External Web links	One as a resource or none	Many linked to support activities
Approach to learning	An instructional approach	An exploratory approach

A majority (10/12) described their WSG as an “Instructional guide” or a “Self-study guide”. The learning strategy applied in most of these was, to provide some information, give some questions as an activity, provide answers as feedback, and indicate some resources at the end to obtain further information.

In most of these instructional WSGs, the information was presented as descriptions to be read from the screen, similar to that from a book. However many participants stressed that this information essentially needed to be included. Nalini explained that, “For the learner who is learning in isolation, we should provide all the information in our guide”. This ‘top-down manner’ reflected an instructivist approach of transmitting knowledge to the learners, which they are familiar with.

However, they also tried to include some features that they learnt in the course as suitable in a Web environment, such as reduced content, small chunks of information, flexible hyperlinking and different activities, to make it ‘different from a book’ as they claimed their WSGs to be.

Only two people, Epa and Karu, significantly attempted to deviate from this ‘traditional’ approach. These WSGs provided only some brief points on the topic, and used activities to engage learners in finding out information and building up understandings by themselves, reflecting a ‘constructivist learning environment’. Epa declared that, “This is just providing some brief information to find out other information sources. There is a great deal to explore here”, and further explained, “I was mostly influenced by the constructivist approach, but I was unable to accomplish it completely.” Figure 1 shows a screen capture of a page of Epa’s WSG which illustrate the above feature.

### Video Teleconference

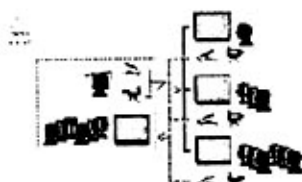


Diagram shows how Video Teleconference works

- Instructions are designed and prepared carefully. In this process, they are drafted and discussed in specialist groups and refined the subject matter. Media specialists take decisions pertaining to media requirements.
- Instructions are transmitted from the delivery end at a certain pace, which has been recognized as desirable.
- Learners listen to instructions, see the instructor, text, graphic and other visual information and widen their field of experience. They can ask questions from the instructor. Instructor can see students, their motions and ask questions.



Home



Workshop

opening section

study guide section

supplementary section

Acknowledgment/ Objectives/ Features

Radio | Air-Tele | Air-Graphic Tele | TV | Television Semi-Tele | Video conferencing

Figure 1: Presentation of information in Epa’s WSG

However, both of them started planning their WSGs in the familiar instructivist way. Kary changed his approach in the planning stage itself, whereas Epa almost completed developing one instructivist WSG, and at a very late stage started on a new WSG using a constructivist approach. These two people were more familiar with using computers, and were prepared to take different approach from what they were accustomed to. They understood the basic features of a constructivist learning environment (introduced in the course), and tried to develop their WSGs so that it included some of these features.

Another main difference of these two WSGs was that the information was not presented in a sequential manner, whereas the rest directed the learners page by page using forward arrows or links, similar to that of a book. Both Epa and Karu did not use any forward links, but provided a flexible environment where all the topics were at a similar level. The learners could navigate to any section they desired using a navigation panel included in all pages. The screen capture in figure 2 illustrates how Karu arranged his topics in a flexible site map, and had the main sections indicated in the navigation panel.

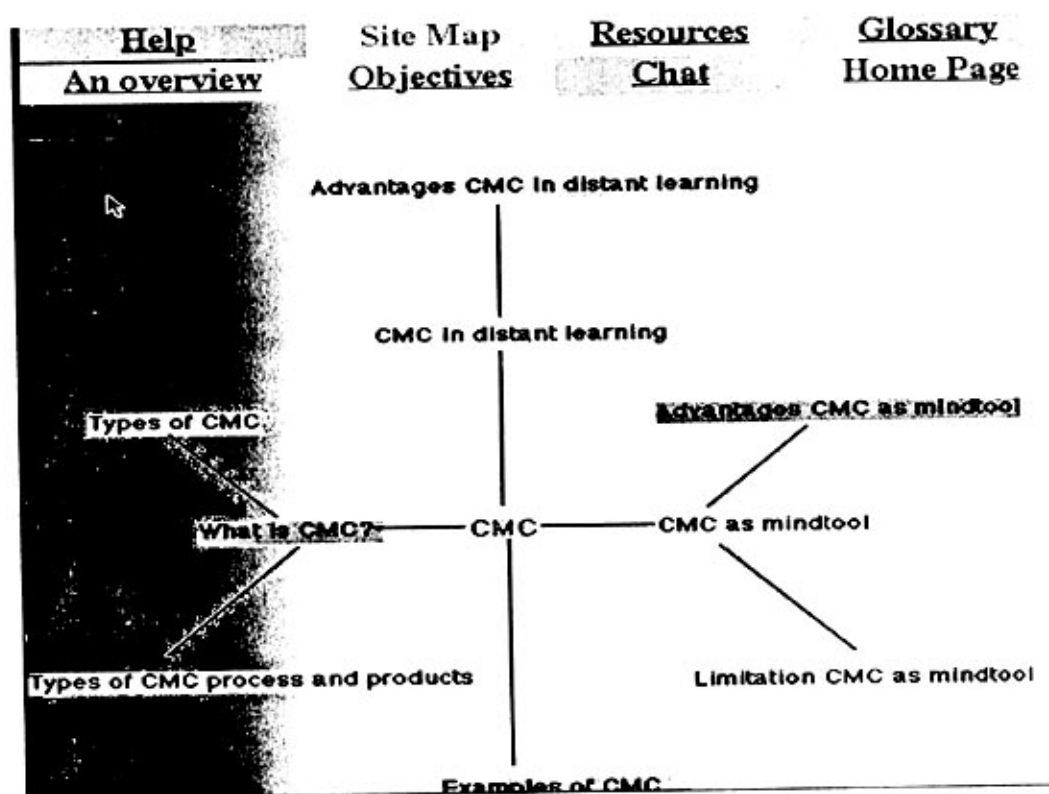


Figure 2: Site Map and Navigation Panel in Karu's WSG

The others (except Tony who claimed that there was no sequential order in his WSG even though forward arrows were provided), explained that they had to present the information on their topics from "simple to complex" or "known to unknown" concepts. However, they too have tried to increase the flexibility of navigation by including a navigation panel with all the topics in each page, except Nalini who thought that was not needed because her WSG was "easy to follow and not complicated".

### Activities

All participants had used activities and feedback in their WSGs with different intentions. The most common purposes stated by the people who took an instructivist approach were to, "recall facts" or "apply the learnt facts". In these cases, the activities were considered as self-evaluations to "reinforce learning".

Some included activities to find out information from other sources, yet did not facilitate that by providing links to any resources. The learners were expected to find out facts by reading books, or through the feedback that provided direct answers. They did not utilise the available resources in the Web environment, to facilitate the learners in building up knowledge. This maybe due to their limitations in understandings and skills.

In the more constructivist environments, the activities were used in a different way. Epa provided activities for the learners to find more information on the topics. Karu's WSG allowed the learners to build up their own learning through group activities, and feedback was given only as some guidelines. In all the other instances, feedback provided answers to the questions.

Karu had linked many external Web resources for that purpose. Only this WSG allowed group interactivity through an online discussion area, supporting collaborative learning. There were only two other instances where the learners were given the opportunity to interact with the instructor via e-mail feedback form.

### External web links

Of the twelve participants, only three who were majoring in IT had many external Web sites linked to their WSGs, as resources for learners. Six had a single common Web site linked to their WSGs, without an indication of its relevance to the topic. This was mainly done as an assignment requirement, rather than a need of the WSG.

Although time limitation was indeed a major constraint faced by all, the reluctance to search for even a few external Web sites, may be the result of insufficient exposure and confidence in using the Internet, and a few of wasting time by 'getting lost in hyperspace'.

### Special features

Inclusion of special features such as images, animations, different background and font colours, was done by everyone. Some of them had different background colours, one

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