

The “Web Technology” Distance Course

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ABSTRACT

In the paper we identify the milestones of a technique developed to meet the needs of a new type of learning, which beneficially exploits the domain of the distance-learning courses. The structure, design issues and examples from the distance education course “Web technology” are presented. This is a course developed by us and delivers as a master course through the Kettering University.

1. INTRODUCTION

In the last few years distance learning has become a major topic in education. According to [6] in 2002 more than 1680 institutions offered over 54 000 distance courses. Some people indicate the beginning of distance education in the late 1800s when Frederick Turner ran the correspondence history program of the University of Wisconsin. Recent research clearly shows that student who learn at a distance do not learn any better or any worse than the traditional students. Distance education is defined as institution-based, formal education where the learners are separated, and where interactive telecommunication systems are used to connect instructors, learners and resources.

The distance education is a revolutionary leap, which brings out the needs and requirements of a new generation of learners, who wouldn't be reconciled with education operating at the level of delivery of course material. They would rather look for the creation and use of new kinds of learning environments, which reflects in a better way the complexity of the learning process and learner's role in education – that of an explorer and creator rather than of a consumer. There is a new vision developed during the past 15-20 years, strongly influenced by the social and cognitive sciences. The educational system is now focused on learning rather than on teaching.

According to [1] they are seven factors defining the distant learner satisfaction: (1) instructor/instruction, (2)

technology, (3) course management, (4) at site personal, (5) promptness of material delivery, (6) support services, (7) out-of-campus communication with the instructor.

There are some basic requirements applied to the effective use of any learning environment, which we follow in our course. A medium should be:

- Clearly supportive to the learning objectives;
- One that learners find attractive to learn;
- Available to the learners – where and when they need it;
- Convenient for the learners to use and to control the timing and their own pace of learning;
- One for which the learners can quickly acquire the skills to use effectively;
- One that the instructor have the skills and know-how to use effectively;
- One that relates clearly to other media;
- One that both instructors and learners can afford to use.

The learning in the new environment contributes to the building up of a number of skills, which are to become inherent in the educational practices of the new generation of learners, such as:

- To quickly orient oneself, locate and pick the needed information;
- To communicate critically by e-mail;
- To learn how to do project work;
- To apply knowledge to a problem-solving situation.

Integration of theory into practice has always offering a challenge, particularly, when there is no visual contact between instructor and learner. So, the selection of skills-oriented and skills-developing type of exercises is of paramount significance because they contribute to the building up of learner's confidence, and is a real incentive for further practice. Each session in our course provides with a panel of such exercises including:

- A matching exercise;
- A multiple choice exercise;
- A gap-filling exercise;
- An open-question.

Varieties of connections to other web sites provide opportunities for the learner to convert information into

knowledge and make it meaningful by applying it to a particular specific human activity.

In the paper we identify the milestones of a technique developed to meet the needs of a new type of learning, which beneficially exploits the domain of the distance-learning courses. The structure, design issues and examples from the distance course “Web technology” are presented.

The layout of the paper is as follows. In section 2 we present the structure of the distance course “Web technology”. In section 3 we analyze the course design. In section 4 examples from the course materials are shown, and finally in section 5 the conclusions and future work are presented.

2. THE DISTANCE COURSE “WEB TECHNOLOGY” STRUCTURE

“Web technology” is a distance course, which we design and implement in the frame of the “Master of Science in Information Technology program” in the Kettering University. This program includes ten four-credit courses. The curriculum consists of:

- Information Management;
- Managing an e-Business;
- Analysis, Modeling, and Design;
- Managing IT Infrastructure;
- Project and Change Management;
- IT Policy and Strategy;
- Integrating the Enterprise;
- Managing People & Technology;
- Web Technology;
- Software Requirements Engineering.

The course is based on video tapes, textbooks, “Blackboard” system based information and e-mail communications. The video tapes contain the lectures. The course is accompanied by a list of books, which are required to be used by the learner to prepare for each session as well as a list of recommended books and papers, which discuss various issues and elaborate on the topics. The textbooks are [4, 5, 7]. They are given to the students. As additional readings the following books are also listed [2, 3]. The course is delivered for USA and India students in the moment.

An electronic course-organizer site is more than a source of information. It becomes a learning environment for the course itself. The course materials for this course on “Blackboard” system include:

a. Course information

In this section the syllabus is given. It includes:

Course description: The concepts, principles, issues and techniques for web technology. The main principles and protocols in Internet, the key components in XHTML,

JavaScript, PERL, CGI, Java Applets, XML, Web database applications using MySQL and PHP are studied.

Course objectives: This course provides an understanding and application of web technology and design processes. Each student who receives credit will have demonstrated the ability to:

- Explain the overall evolution of the Internet and the World Wide Web;
- Create own resume with the key components of the XHTML, using images, hyperlinks, lists, tables, forms, image maps, frames, cascading style sheets;
- Create dynamic Web reservation system using XHTML and Java Script;
- Create Common Gateway Interface program allowing the calculations to be done on the server site using PERL;
- Create shopping car database application using XML, Java Applets, MySQL and PHP.

Course topics:

- HTML. Basic HTML. The Document Body. Text. Hyperlinks. Formatting. Lists. Tables. Color and Images. Multimedia Objects. Frames. Forms.
- XHTML - An Evolutionary Markup.
- Cascading Style sheets. Using Styles. Defining Your Own Styles. Properties and Values in Styles. Formatting Blocks of Information. Layers.
- Dynamic HTML. JavaScript - The Basics. Variables. String Manipulation. Mathematical Functions. Statements. Operators. Arrays. Functions. Objects in JavaScript. Regular Expressions. Exception Handling. Built-in Objects. Events. Data Validation. Opening a New Window. Messages and Confirmations. The Status Bar. Writing to a Different Frame. Rollover Buttons. Moving Images. Multiple Pages in a Single Download. A Text-only Menu System.
- Programming in Perl. Scalars. Arrays. Hashes. Control Structures. Processing Text. Regular Expressions. Using Files. Subroutines. Bits and Pieces.
- CGI Scripting. Developing CGI Applications. Processing CGI. CGI.pm Methods. Creating HTML Pages Dynamically. Using CGI.pm.
- An Introduction to PHP. Variables. Program Control. Built-in Functions.
- MySQL. Connection with Web Database.
- Active Server Pages and Java. Active Server Pages. Java applets.
- XML: Defining Data for Web Applications. Basic XML. Document Type. XML Schema. Document Object Model. Presenting XML.

Course grading: The various course contents count as follows toward final grade: Assignment 1 - 10%,

Assignment 2 – 10%, Assignment 3 – 10%, Midterm exam 1 - 20%, Midterm exam 2 - 20%, Nine Quizzes – 5%, Final Exam – project 10%, questions - 15%.

Course policies:

- Assignments and quizzes to be mailed submitted or answered before the due time.
- The questions can be of the multiple-choice kind, fill in the blanks, solving problems, writing programs.

b. Staff information

This section includes the instructor name, work phone, office location, office hours, and home page.

c. Streaming video sessions

This section includes the video modules from every week. The modules are usually about 30 minute's lectures.

d. Course documents

This section includes:

The instructor MS power point slides. Usually every session is divided into:

- Introduction to the session;
- Aims and Objectives;
- Historical facts;
- Definitions of the important terms used in the session;
- Session reading text;
- Program examples in HTML, JavaScript, Perl, PHP, MySQL, Java applets;
- Video tutorials for Adobe Acrobat, JavaScript, Internet, HTML, Web Applications Designing, Web Pages Discover, FrontPage, Internet Graphics, Illustrator, Photoshop, Web Graphics Programming;
- Link to a list with connections to Web sites with related to the session information;
- Session quiz;
- Wrap-up part.

e. Assignments

In this section the students find:

- Every week quiz, taken automatically;
- Program assignments;
- Midterm exams, containing multiple-choice questions and programming assignments;
- Final exam, contains project programming assignment and multiple choice questions;
- Self-test questions and answers to self-test questions.

f. Communications

In this section they are tools for: Announcements, Collaboration, Discussion Boards, Group Pages, Messages, Roster and Send E-mail.

g. Tools

In this section the students find: Address Book, Calendar, Digital Drop Box, Edit Your Homepage, Electric Blackboard, Glossary, Personal Information, Student Manual, Tasks, and View Grades. Especially the drop box is very useful for sending program assignments.

3. THE DISTANCE COURSE “WEB TECHNOLOGY” DESIGN

The course design takes into account the specific character of the medium with a number of key design issues:

- The balance between video and “Blackboard” system based materials and links and references to external sources and locally available materials;
- The extent to which communication and information is integrated in the course.

Some further technical issues taken into account by creating the course, reflecting the specific medium include:

- Proper choice of the background color and the lettering color – psychologically recommended color combinations are used for the total design of the site so that the learner can make the most of the supplied information. Some colors are not used because they are not good for video recording;
- Proper choice of letter size - 24 or 36 points; of letter font - sans serif font; number of words in line – six; number of lines per slide – six; letter case - combination of both uppercase and lower case letters, “white space” – plenty of;
- Use of graphs and charts in the texts to visualize the content. Perception and apprehension of the learning content is enhanced in the cases within graphs and charts are used;
- Uniform graphic and color design of the sessions is observed throughout the course. Different size or color type, different background color or different layout of the information is not admitted;
- Consistency in the content structure. Each session is compiled of one and the same parts.

The choice of approved assignment indicates learners' level of achievement on the course and the standard attained. It is intended to verify how well learners are able to meet the session objectives on the one hand, and the degree of transfer of knowledge they can make, on the other.

Throughout the distance course of education, learners should be assessed formally. The formal assessment is a continuous assessment of a learner's contribution. The course has the following assessment elements:

- Programming assignments in HTML, JavaScript and Perl;
- Quizzes after every session;
- Two midterm exams with multiple choice questions and programming assignments in HTML, JavaScript and Perl;
- Final exam with programming project in Java, PHP and MySQL and multiple choice questions.

4. EXAMPLES OF THE DISTANCE COURSE “WEB TECHNOLOGY” MATERIALS

In this section examples of several course materials are given.

a. Example of course outline:

week	Topic	Assignment *
1	Introduction: Web browsers, Web Graphics Chapters 1.2,3 from 1 Module 1 - Course information Module 2 - Introduction to Computers Module 3 - Introduction to Internet Module 4 - Web browsers Module 5 - MS Explorer, Netscape Module 6 - Adobe Photoshop Elements: Creating Web Graphics Module 7 - Wrap-up	Read chapter 1.2,3 from [Internet & World Wide Web How to Program] and answer the self-review questions after the chapters + quiz 1
2	XHTML - part 1 Chapter 4 and part of chapter 5 from [Internet & World Wide Web How to Program] and answer the self-review questions after the chapters + quiz 2	Read chapter 4 and part of chapter 5 from [Internet & World Wide Web How to Program] and answer the self-review questions after the chapters + quiz 2
3	XHTML - part 2 Part of chapter 5 and chapter 6 from 1 Module 1 - X HyperText Markup Language - Forms Module 2 - X HyperText Markup Language - Cascading Style Sheets Module 3 - Wrap-up	Read part of chapter 5 and chapter 6 from [Internet & World Wide Web How to Program] and answer the self-review questions after the chapters + quiz 3 Start Assignment 1
4	JavaScript - part 1 Chapter 7,8,9, 10 and 11 from 1 Module 1 - Web pages Module 2 - JavaScript - Introduction Module 3 - JavaScript - Examples Module 4 - Lexical Structure, Variables and Data Types, Expression and Operators Module 5 - Statements Module 6 - Functions Module 7 - Arrays Module 8 - Wrap-up	Read chapters 7, 8, 9, 10 and 11 from [Internet & World Wide Web How to Program] and answer the self-review questions after the chapters + quiz 4 Due time for Assignment 1. Start Assignment 2
5	JavaScript - part 2 Chapter 12, 13, and 14 from 1 Module 1 - JavaScript - review Module 2 - Objects: Math, String, Date objects Module 3 - Window object Module 4 - Document object Module 5 - Cookies Module 6 - Form object Module 7 - Navigator object Module 8 - Location object, History object Module 9 - Events Module 10 - Wrap-up	Read chapter 12, 13 and 14 from [Internet & World Wide Web How to Program] and answer the self-review questions after the chapters + quiz 5
6	Midterm 1	Due date for Assignment 2
7	week 7 - Perl - part 1 Module 1: Introduction Module 2: Scalar data Module 3: List and arrays Module 4: Associative Arrays, Basic I/O operations Module 5: Regular expressions Module 6: Wrap-up	Read chapters 1, 2, 3, 4, 5, 6, 7, 8, 9 from [Learning Perl] + quiz 6 Start Assignment 3
8	week 8 - Perl - part 2 Module 1: Functions Module 2: Miscellaneous Control Structures Module 3: Filehandles and File Tests Module 4: Formats Module 5: Data transformation Module 6: CGI (Common Gateway Interface) Module 7: Wrap-up	Read chapters 4, 10, 11, 12, 13 from [2] + quiz 7
9	Midterm 2	Due time for Assignment 3
10	Week 10 - PHP and MySQL Module 1: PHP Module 2: MySQL	Read chapters 1, 2, 3, 4, 5, 6 from [Web Database Applications with PHP and MySQL] + Quiz 8
11	Week 11: Module 1: XML Module 2: Macromedia Flash Module 3: Macromedia Dreamweaver	Read chapters 18, 19, 20 from [Internet & World Wide Web How to Program] + Quiz 9
12	FINAL	

b. Example of course programming assignment:

Write a program in JavaScript to create the given form:

Check for:

[10 points] All fields are required;

[10 points] The total number of passengers is between 1 and 6;

[10+10 points] The dates are correct incoming dates not more than a year from “today”;

[10 points] Create and fill with data a table with 10 rows and with the following columns: from city, from state, from code, to city, to state, to code, price adult, price child, price senior, price infant (seated), price infant (lap);

[10 points] If the fly is a “not stop” fly try to find if such fly is possible using the table;

[10 points] Print a new page – with the type of error or the total prize. The price is the sum of the prices on the different legs.

Finding the best-priced airline fares usually requires a 21, 14 or 7 day advance purchase. Check departures on Tue, Wed or Sat as well as alternate airports for the best rates.

One Way
 Round Trip
 Multiple Leg

Type city and state (State is optional and must be 2 letter code) or airport code into the from and to boxes.

From : To :

Depart Around : 12 PM 2/23/2001

Return Around : 12 PM 2/27/2001

Non-Stop Only :

Search for: 10 Best Fares
 10 Best Time Matched Fares
 5 Best Fares and 5 Best Time Matched Fares

Number Of Passengers

Adults 1 12 to 64

Children 0 Age 2-11

Seniors 0 65 +

Infants 0 Age 0-1 (Seated)

Infants 0 Age 0-1 (Lap)

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c. Example of course multiple-choice exam question:

Name: midterm1

Instructions:

Timed assessment: This test has a 30 minute time limit. The elapsed time appears at the bottom of your browser. A 1 minute warning will be displayed. [Note: the time limit does not apply when previewing this test]

Multiple Attempts: NOT ALLOWED. This test may only be taken once.

Force Completion: This test must be completed now. It CANNOT be resumed later.

Question 7 Multiple Choice 2 points

Ordered lists by default are preceded by _____.

- a. discs
- b. circles
- c. squares
- d. numbers

Moving to another question will save your response.

d. Example of course programming assignment:

For the final project you are expected to design, develop, implement and demonstrate a web site by which you can sell products of your choice. The web site should have the following features:

A shopping cart which allows users to:

[10 points] Place items in it;

[10 points] Remove items from the cart;

[10 points] View the cart content;

[20 points] A search tool which allows users to quickly find items they want to buy.

An administrative tool which allows an administrator to:

[10 points] Change the price of items;

[10 points] Adjust inventory as needed;

[10 points] Display list of items, prices, and quantities;

[10 points] Please note when you display an item with its description and price, you should also display the numbers of items left. As the user purchases the item, the inventory should reduce accordingly.

[10 points] Documentation includes a short (1-2 pages) description of your application, and the source code.

e. Example of course slide:

CS541 – Week 4 - Wrap-up



- Answer the self-review questions on pages 204, 242, 288, 330 and 372 from the first textbook
- Take the quiz 4

5. CONCLUSIONS

Like in the development of a good textbook, the development of good distance educational course is a long-term process of trials and errors. I have more communications with these students than with my regular students. I receive e-mails at least once a week from all of them. I meet one of them coming in “Discovery Kettering” with his son. He was so exited from the course that he wants his son to be a regular student in my University. I hope after several course evaluations by the students and making the necessary corrections our University will offer an expellant “Web technology” distance course.

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