Effective Computer-Based Courseware Development: "UNIX for Beginners"

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Abstract:

This article describes the steps and procedures involved in creation of a very effective Computer Based Training course. Although the concept itself is not new, the methodology, however, was field tested and proven to be quite innovative. Many instructional books, in order to explain the subject better, include "screen shots" in a form of still images to demonstrate what actually transpires on a computer monitor whenever a given task is performed. This may be satisfactory for some students; however, there are many that feel live video recording is by far more effective and efficient then any other method of instruction. The student may follow along with the professor and see exactly what is being done at any given time. It is almost like watching the professor directly by being next to him in class. In this manner, the student will be exposed not only to visual, but also to audio instruction, thus, highly increasing his/her learning potential.

I. Instructional Problems

Today, more people are using and learning UNIX the ever before. With the emergence of the Internet, there are many applications where knowledge of basic UNIX commands is essential. For example, File Transfer Protocol (FTP), which uses UNIX as its base, is very popular for transferring user files between local systems to web servers. Telnet is a system very popular in the educational world. It has become the operating environment of choice among most college students and faculty. Even though in the initial stages of the introduction of telnet, some faculty members were reluctant to use it, but eventually many became more educated in the subject and began to use it on a daily basis.

The operation and administration of the UNIX operating system has always been a somewhat neglected subject. For many years, it belonged primarily to the experts of the computer world. At the time when personal computers were not available to the general public, and powerful workstations such as SUN and Apollo, due to the high cost factors, were restricted to the large corporations, only the select few had the need to learn or operate UNIX systems. In the past, typically in a large company or university, only one UNIX server, requiring one or two systems administrators, was sufficient to accommodate the required tasks that would serve a large number of client computer terminals on the network.

Even for those who administered UNIX operating systems, initial learning of its commands, structures and procedures was not easy. For the most part, UNIX does not offer a "user-friendly" environment. In addition, UNIX has undergone a variety of modifications, which did not make the adaptation process any easier. Its many varieties still exist today, which makes the process of learning it much more difficult.

However, there is a common thread between all of the system's variations. Most general-purpose commands, even though slightly changed from the past, are fully applicable for most common tasks, especially for casual users.

The "UNIX for Beginners" educational program will offer a simple and direct teaching approach that will cover the most basic and used commands of the operating system. Only the commands applicable to all versions and modifications of UNIX are selected for this product. We feel that this work offers a unique presentation method that will enable users to quickly and effectively become proficient in the subject.

II. Learner Characteristics

The goal of this course is to introduce major aspects of Unix's commands and procedures to both the beginning and the experienced computer user. The tools and commands presented, are those most needed for general every day tasks. Whether your interest in UNIX is at the professional or the hobbyist level, you will find the clear details and examples that you need to become a UNIX user.

The "Unix for Beginners" introductory training course is appropriate mostly for college students and teachers. However, there are many business and industry applications where UNIX is being utilized. Also, many organizations which are not satisfied with general data safety levels of most operating systems, are turning to UNIX to significantly improve levels of security within their networks, as well as individual workstations. In many cases, elaborate and very costly training programs are being implemented in many companies to switch their employees to a UNIX environment.

This work could be an excellent primer for anybody trying to learn the basics, and eventually master the complex arts of the UNIX operating system; it's programming, and administration.

III. Task Analysis

The following tasks will need to be accomplished to complete the project:

1. Design graphical splash screen. This introductory screen will display the logo of the company and the name of the author. It should present some degree of sophistication because it makes the first impression about the company and the product to be used.
2. Design Startup screen. This screen will prompt the student to continue by pressing the "Start" button. Also this screen will display all trademarks associated with the product. An "Exit" button is provided on the same screen, should the user decide to abort the program.

3. Develop an interface suitable for viewing on any modern computer system. The interface will have to properly appear and function in MS-Windows format (this may be later converted to Apple or additional international formats). For this task, MS Visual BASIC 6.0 software will be employed. The final compiled executable file will assure smooth operation for most Windows operating systems (i.e. 95/98, 2000, and NT).
4. The main interface will have a special message window. This window will announce to the user which lesson is about to start. When the user moves the mouse, without pressing it, over the specific lesson number button, the message specifying the name of the particular lesson will automatically appear in a message window.
5. Develop the main push button console. Since the courseware will contain 30 lessons, each concentrating on specific topic, 30 push buttons need to be designed, each representing the lesson number. The main console, which is the only interface menu that will be used by the learner throughout the entire course, is programmed to appear in the middle of the computer screen. It is designed to cover approximately 30% of the monitor area, so that it will be quite easy to move around, even if the monitor is set to 640 X 480 pixels screen resolution.
6. Create an "About" button and a file that will appear in a small separate window. This file will describe basic information about the company publishing this courseware product, and the author's name and credentials. The text information could be written in standard text format, and programmed to be visible when the button is pressed. It is also equipped with "Close" button to exit the "About" window and to continue with the program.
7. Create a help file, accessed by a "Help" button from the main interface menu. The actual help file will be written separately, in Rich Text Format (RTF) and invoked by the button to appear in a separate window, equipped with a scroll bar, so that it will be easier to navigate through text. This window is also equipped with a "Close " button.
8. Develop 30 lessons that will encompass the most major aspects of UNIX commands and procedures. This is a largest part of the courseware development process. The content will have to be carefully selected and presented in a proper sequence. Because the UNIX operating system contains hundreds of commands, with many variations and procedures, due to the space limitation on a CD-ROM, it is of vital importance to select only the most commonly used items. This process has to rely totally on the experience and the skill of the author to know what is needed the most, what "not to teach", and still develop a structured and complete training program which is fully applicable to real-world situations.

The video lessons will capture all mouse movements and keystrokes performed by the instructor, voice narration will synchronously accompany the presentation, explaining each individual procedure.

IV. Instructional objectives

1. Course Objectives:

To become familiar with the UNIX operating system. To learn it's general functions and procedures. To familiarize the students with the most commonly used commands in a typical UNIX environment. Also, to address most common basic administration issues, including UNIX security schemes.

2. Learning Objectives:

At the completion of the "UNIX for Beginners" course, the students will be able to:

- Understand the UNIX interface, using the "telnet" environment
- Understand general UNIX structures.
- Manipulate freely within the operating system.
- Use standard UNIX syntax.
- Create text files using PICO text editor.
- Create text files using VI text editor.
- Generate and manipulate directory (folder) hierarchy.
- Address UNIX security issues, using password and permission schemes.
- Address general system administration and user-level issues.
- Utilize UNIX to perform mathematical functions.
- Identify individual computers and user groups on the network.
- Create custom aliases for standard UNIX commands.

V. Teaching / Instructional Strategies

Teaching UNIX, in general, is not an easy task. Since the UNIX environment is not a particularly "friendly" one, when the professor presents the material personally in class it is generally considered to be more effective then remote teaching. One of the reasons is that UNIX is very text-intensive, there are no graphics or any multimedia effects that exist in the typical UNIX system environment. This makes it more difficult for students to remember the commands and procedures. I feel that the most effective approach for teaching any computer applications, is to present the material using direct video recording, in this case utilizing the "AVI" Video format. Using this method, the instructor simply records every step, live, directly onto video capturing utilities on the computer.

Many instructional books, in order to explain the subject better, include "screen shots" in a form of still images to demonstrate what actually transpires on a computer monitor whenever a given task is performed. This may be satisfactory for some students, however, there are many that feel live video recording is by far more effective and efficient then any other method of instruction. The student may follow along with the professor and see exactly what is being done at any given time. It is almost like watching the professor directly by being next to him in class. In this manner, the student will be

exposed not only to visual, but also to audio instruction, thus, highly increasing his/her learning potential. Structured similar to the book "Instructional Design" by Patricia Smith and Tillman Ragan (1999), this work contains essential fundamentals with an abundance of examples and exercises.

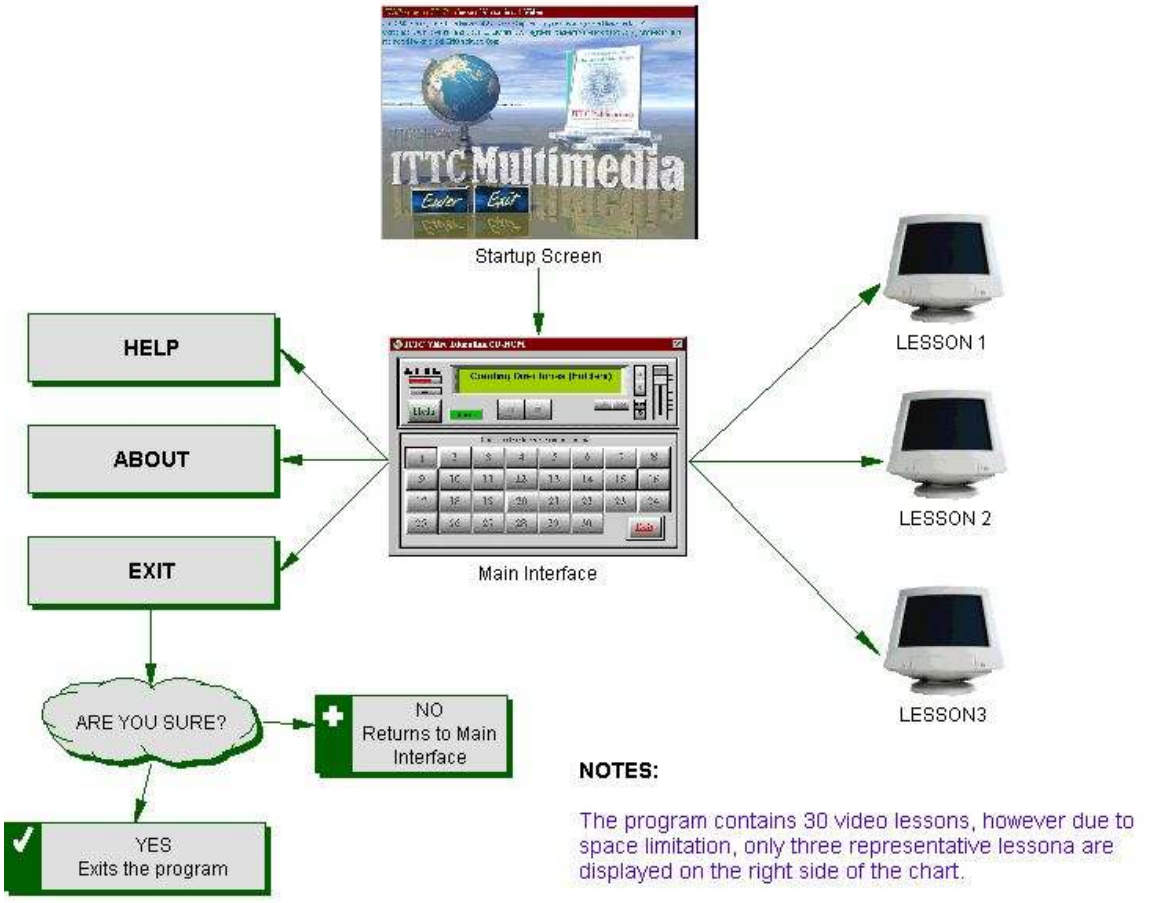
VI. Content Outline.

The entire content consists of 30 lessons in standard MS WINDOWS video format with audio narration by the instructor. When delivered on a CD-ROM, the students can view, pause, and continue each lesson at any time. If the course is presented online, this may be restricted by the time limitation, depending on specific registration arrangements between the student and the online learning delivery distribution company.

Lesson No.:	***Description:***
1	Introduction, PWD, Clearing the Screen
2	Creating Directories (Folders)
3	Changing Directories & Subdirectories
4	Navigating Between Directories
5	Removing Directories
6	LS – Listing File Options
7	Using MAN Pages – UNIX Help Utility
8	Forwarding Listing to a File
9	Forwarding Listing or a File to the Printer
10	Obtaining a Listing of a Specific Directory
11	Using UNIX Calculator (BC)
12	Displaying Time and Date
13	Using UNIX Calendar (CAL)
14	UNIX Administrative Permissions
15	Advanced Permissions (CHMOD)
16	Changing Permissions for a Group of Files
17	Renaming and Moving Files
18	Copying Files and Directories
19	Displaying the Content of a File
20	Using the HEAD Command to display File Content
21	Displaying User ID, FINGER Command
22	Editing Text Files with PICO Editor
23	Editing Text Files with VI Editor
24	Changing Password in UNIX
25	Removing (Deleting Files)
26	Creating ALIAS Shortcuts in UNIX
27	WHOAMI Identification Command
28	Using TTY to Identify Systems on a Network
29	Using the History Command
30	Entering & Exiting Unix Systems

UNIX For Beginners

Flowchart of Major Courseware Components

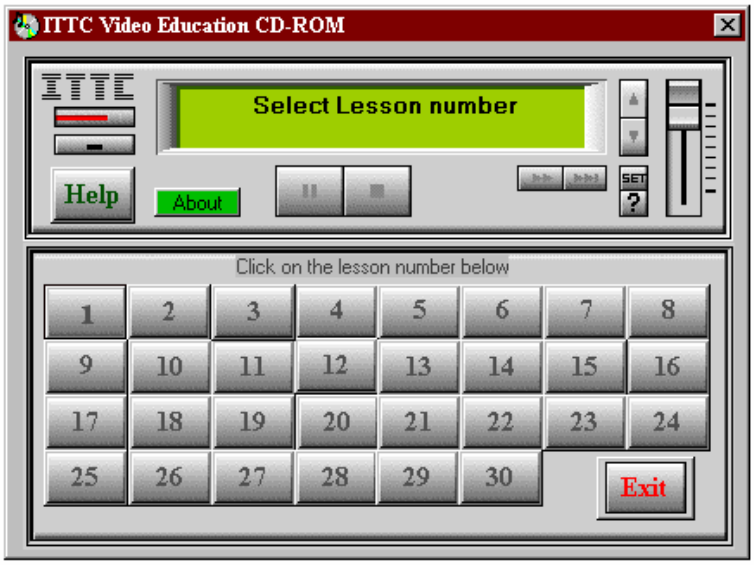


NOTES:

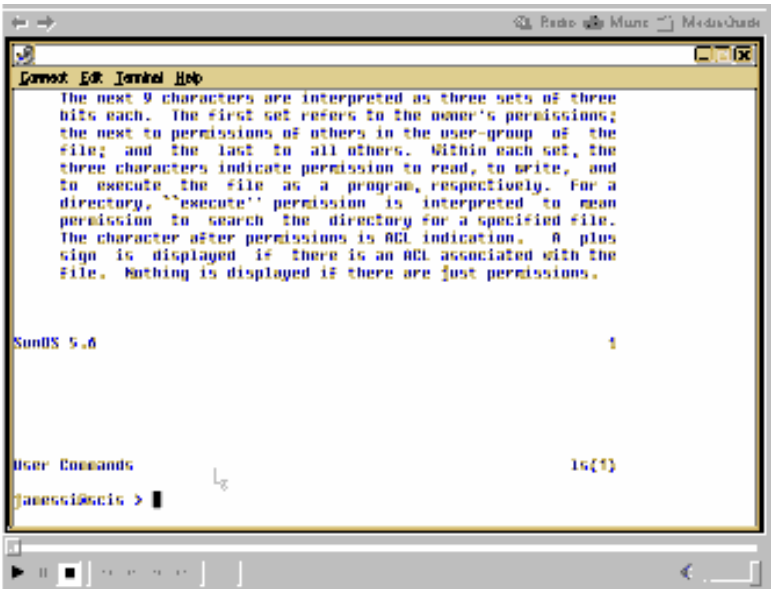
The program contains 30 video lessons, however due to space limitation, only three representative lessona are displayed on the right side of the chart.

The video lessons are displayed in the AVI format using any available media player on the user system. Additional interface, while the video is playing is located on the media consoles of the individual computers.

Startup screen.



Main Interface Menu.



VII. Hardware and Software Description & Trademarks.

In the development process of creating the "UNIX for Beginners" courseware, the following list of hardware and software will be utilized:

1. Hardware:

Dell, Pentium III, 500 MHz. Processor
Windows NT 4.0 operating system
128 MB. RAM
22 GB IDE hard drive
15" SVGA Monitor, supports 24 bit graphics.
800 X 600-pixel resolution,
8MB Video RAM on Genoa V-Card
48 X CD-ROM, 4X CD-RW capability
101-key standard keyboard
Microsoft serial mouse
Stereo Speakers

2. Software:

Inspiration 6.0
Power Point 2000
AutoCAD 2000
Telnet UNIX Shell
BRYCE 4.0

3. Trademarks:

Inspiration is a registered trademark of Inspiration Software Inc.
Power Point is a registered trademark of Microsoft Corporation.
AutoCAD is a registered trademark of Autodesk Corporation.
UNIX is a registered trademark of American Telephone & Telegraph Corp.
BRYCE is a registered trademark of Metacreations Corporation.

VIII. Minimum System Requirements.

Note: This program does not require any additional hard drive space. It is not installed onto your computer. All required operations are performed directly from the CD-ROM. Please make sure that your CD-ROM is functioning properly before running this educational program.

General System Requirements:

- Pentium-class computer 200 MHz. Min.
- Screen resolution is to be set to 800 X 600 or higher
- Screen colors are to be set to 16 bit or higher (at lower resolution the quality may be significantly diminished).

- CD-ROM or DVD drive capable of playing video AVI segments or movies. This is standard on all modern CD ROM drives.
- Minimum 32 MB RAM (the program will still run with less then minimum RAM required, but you may not get the desired results in speed or video reproduction quality).
- Any Windows Media Player programs, including the player that is always included in all standard MS Windows installations.
- Any commercial speakers.

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Winters, Elaine. (1995). **Seven Styles of Learning: The Part they Play When Developing Interactivity.** [Online]. Available: http://www.bena.com/ewinters/styles.html [August 22]

Software Resources:

AutoCAD 2006, [CD ROM], (2005). Sousalido, CA: Autodesk Corporation

BRYCE 4.0, [CD ROM], (1999). Princeton, NJ: Metacreations Corporation

Image Resources:

Sinclair, James A. (2005). All Original Graphics by the Author.