A Multimedia Online Computer Literacy Course: Development and Preliminary Evaluation

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Introduction:

At Texas Southern University (TSU), a Historically Black Colleges and Universities (HBCU) member, a pilot project, consisting in the creation of an online course, has been realized. While this endeavor is quite common in other universities, HBCUs have, in general, been somewhat lagging behind in offering online courses to their students. Indeed, results of a study [1] shows that only 25% of HBCUs offer online programs compared to 79% of public four-year institutions and 47% of private four-year institutions. This is due in part to the socio-economical status of the student population (see [2,3,4]) and also to the relatively low endowments that HBCUs receive [1].

The course selected for this pilot project is a computer literacy course, known as CS116 or COSC1300. This course covers topics such as computer hardware and software, and computer applications such as word processing, spreadsheets, and report preparation. CS116 is a prerequisite course for all majors offered at Texas Southern University, which makes it a very high demand, very heavy attendance course. Consequently, it was deemed appropriate to produce an online version of this course, with the hope that this would alleviate the teaching load of faculty members. However, before launching this course online, it had to be tested on its effectiveness as a learning tool.
In the following, we describe the website development and give a preliminary evaluation of its effectiveness as a teaching tool.

Developing the online course

In designing the online course, three main requirements were of importance to the designers:

- Organization: The website had to be organized and the content was to be presented in such a way that the student is aware of his or her learning goals. In order to realize this, the content of the course was divided into subjects. Four subjects have been covered so far. For each subject, topics were defined. Each topic was in turn divided in sessions. The chunking of the content into small discrete units resulted in small "easy to digest" modules, and facilitated the site navigation and information location.

- Simplicity: the website had to be kept simple and friendly in order to present the content in an easy to understand way. This second objective not only impacted the choice of words but also the presentation of the material. A combination of approaches was used:
  - The use of simple instructional language.

    - The use of different colors, fonts, headings so that the main points are emphasized visually.
    - The use of graphics as an aid to learning and as an illustration of a given concept (for example which icon represents the MS Word application).
    - The use of video clips to illustrate various processes (for example how to save a document).
- Navigation: The website had to be easy to navigate and the information easy to find. Regarding this third requirement; the page layouts was designed in order to look simple and navigational elements, such as next, previous, up, were incorporated in each page in order to facilitate moving through the learning material in a sequential manner or revisit previous modules easily.

Technical Requirements:

This project was given a time frame of three months to be realized. The team consisted of a faculty member and two junior Computer Science students as research assistants. A graduate assistant was in charge of providing the infrastructure, organizing and administrating the students' tests. The tools chosen had to enable each member to work independently until the whole site could be consolidated into one. The software used had to either be readily available at the Computer Science department at TSU or be public domain software.

Web Page Creation:

Microsoft FrontPage 2000 was used to develop the website. However, FrontPage was often found inadequate for some of the functionality that the team wanted; consequently others tools (JavaScript and HTML) were used. The final version of the website was entirely re-written in JavaScript for a more personalized look and a better functionality.

Graphics Creation:

Most graphics included in the website were screen captures. Screen captures were necessary to illustrate specific applications and processes. Graphic software was used to edit and caption the captured pictures. Many free graphics software were considered. Finally, the team opted for the free GNU Image Manipulation Program (GIMP) at (http://www.gimp.org) because it offered the best tools and functionality.

Video Creation:

Short video clips depicting how to perform a specific action were included in the website. These clips were realized using the CamStudio freeware (by RenderSoft at http://www.rendersoftware.com). Although, the quality of the video was excellent, its integration in the website was not fully satisfactory due to differences in screen resolution and other limitations.

Educational Goals:

This project covers four fundamental topics of COSC1300 or CS160:

- Introduction to computer hardware and software, in which learners are introduced to the concept of computers, input/output devices, memory, operating systems, etc.

- Introduction to Microsoft Windows 2000, in which the main components of Microsoft Windows 2000 are presented.

- Microsoft Word 2000 Application in which Microsoft word processing application and its features are introduced.

-Microsoft Excel 2000 Application in which Microsoft spreadsheet application and its features are explained.

Evaluating the Online Course:

Focus Group:

This website has been tested with one section of students enrolled in the CS116 computer literacy course. These students were not enrolled to take the course online. They were given access to the website and then were given lectures and hands on practice sessions. This section has an enrollment of 147 students. Prior to starting the course, students were administrated an exam in order to test-out of the course.128 students took part in the test. Two post-tests were then administrated. The sample was processed further to disqualify any student who did not take part in the two post- tests. The final sample consisted of 58 students, which constitutes our focus group.

Testing procedure:

For the test-out exam, questions were generated by an educational software independently of the content of the website. The exam contained 55 multiple-choice questions (4 choices were given for each question), divided amongst the four topics described above. In order to test out of the course, students had to achieve a grade of C (75% or better).
Before a subject was lectured in class, students were requested, as an assignment, to access and study the subject from the website. A post-test was then administrated to them. This test contained the same questions as the pre-test, but confined to the subject studied. Three topics were covered by the post-tests: Introduction to Computers, Windows 2000 and MS Word 2000. The two first topics were combined in a single test. The results of the pre-test exam are used as a baseline to assess the effectiveness of the website material.
A midterm exam, covering the four topics was also administrated to the section and was used to compare the results of the focus group with those of the other students in the section.

Results and Discussion:

The table below shows the pre-test (test-out) and post- test results for the 3 topics covered:

	Pre Test		Post Test	
Topic	Mean	S D	Mean	SD
Computers and MS Windows 2000	34	9.5	63.8	11.6
Microsoft Word 2000	46	9	62.70	13.9

Table 1: Pre and Post Test Results

The combined (all four topics, 55 questions) pre-test scores were overall very low (mean= 43.23; SD=8.04). The highest grade was 59, and lowest grade was 26, resulting in no students testing out of the course.

Pre-test results for the topics of Computers and Microsoft Windows 2000 (20 questions) showed an average of 34, (SD=9.5), highest grade was 55, lowest was 10. Pre-test results for the topic of Microsoft Word 2000 (20 questions) showed an average of 46, (SD=9). The highest score was 65; the lowest was 30.

Post-test results for the topics of Computers and MS Windows 2000 showed an average of 63.8 (SD=11.6), which translates into an 86% improvement in grade over the pre-test. The highest grade was 85 and the lowest 33.3. 98% of the students improved their scores over the pre-test.

The post-test results for the topic of MS Word 2000 showed an average of 62.70 (SD=13.9), or a 46% improvement in grade over the pre-test. The highest grade was 88.8 and the lowest was 22.2. 90% of the students improved their scores in the post-test.

In average, there was a 66% improvement in grades over the pre-test for the three topics. 94% of students improved their grades over the pre-test and 17% of them could have tested out of the course after having used the website alone.

A midterm exam was then administrated to the whole section. 99 students took part in the exam. The average of the focus group was 57 (SD=11.4), the highest grade was 76, and the lowest was 35. The average of the rest of the section was 53 (SD=10). The highest grade was 73 and the lowest was 34. Assuming the null hypothesis, i.e. that there is no difference between the results of the two groups, the t-test gives a probability of 0.14. This means that there is 86% likelihood that the results of the two groups are significantly different.

Conclusion and Future Work:

This first experience of developing an online computer literacy course at TSU has been a rewarding one for the developers. It has resulted in the development of a multimedia website combining video, text, still photos and graphics. Preliminary evaluation through a focus group has established the validity of the approach and showed its effectiveness as a teaching tool (94% of students have improved their scores by an average of 66%). Moreover, the focus group, which used the website consistently, had a better performance and scored higher grades in general than the other students.

Before this website can be launched as a stand-alone teaching medium, further improvements are planned. One such improvement is the addition of online pop quizzes and self-assessment units that enable students to gauge their understanding of the topics. A usability study is also under development. This study will point to the directions for enhancing the website, both in topic coverage and in approaches for presenting the material and thus will improve its effectiveness.

Acknowledgements

This project was supported by a seed grant from the College of Graduate Studies at Texas Southern University. The authors wish to thank Ms Tisha Daniels for her help in grading the exams.

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