

# THE LEARNING CAFÉ: PREPARING INNER-CITY HIGH SCHOOL STUDENTS FOR COLLEGE

*Lori L. Scarlatos*  
*Department of Computer and Information Science*  
*Brooklyn College, CUNY*  
*2900 Bedford Ave., Brooklyn, NY 11210*  
*email: lori@sci.brooklyn.cuny.edu*

## ABSTRACT

The Learning Café project prepares at-risk high school students for college by providing computer literacy training (and other multimedia courseware) at a distance. Funded by a grant from the Department of Commerce's Telecommunications and Information Infrastructure Assistance Program (TIIAP), we built four high school Learning Cafés equipped with T-1 lines and 30 workstations each. Developing computer-based training for computer illiterate students, and delivering those courses at sites that we are responsible for but have little control over, accentuated the numerous challenges presented by multimedia courseware and distance education. Our approach was to develop supporting software in three parts: 1) a custom browser to control the remote learning environment, 2) a database that tracks student performance and aids evaluation, and 3) on-line courses designed to get more students into college, and give them the tools that they need once they get there.

## 1. INTRODUCTION

The internet is fast becoming an essential tool in both the workplace and in institutions of higher learning. Yet the ever increasing importance of technology is making it harder than ever for students from poorer districts to compete and succeed at college and at work (U.S. Department of Education, 1999).. This is especially true in our inner cities where language barriers, cultural differences, and other outside pressures erode student confidence and place students at a greater risk of not completing high school or going on to college.

We are addressing this problem with the Learning Café, a project funded by a grant from the Department of Commerce's Telecommunications and Information Infrastructure Assistance Program (TIIAP). This work is consistent with findings that suggest that overburdened urban high schools can benefit from the enrichment that distance education may offer (Williams, Eiserman and Quinn, 1988 and Carr and Young, 1999). Working with four public high schools, we set up four computer labs with T-1 internet access where we deliver a sequence of on-line

courses aimed at students at risk of dropping out of high school. Here students learn to use the new technology, explore career options, and get a head start on their college careers. Students who successfully complete the earlier courses may take a "virtual" college course for credit. Students who successfully complete the program are guaranteed a place in our next freshman class.

A quality interdisciplinary instructional team comprised of faculty, library and technical staff, and designers collaborated to make this project a success. Challenges have arisen because of who is taking the on-line courses (high school students with no technical background, at risk of dropping out), where the courses are being given (in remote high school computer labs) and who is conducting the courses (high school teachers who may not be familiar with the course content). This has forced us to address issues that common to many distance learning efforts, albeit not to the same degree. Some of the issues that we grappled with are:

- What skills and knowledge do students need to compete in both the universities and the workplace? How can we teach that to high school students from a distance, keep the material engaging, get students actively involved in the learning, and make the best use of high school teachers running the classes?
- How to uniformly measure student performance at all locations? We must track usage of the course materials, monitor student progress, and assess student understanding of materials they are working on asynchronously.
- How to manage a remote learning environment that we have little or no control over? Problems include protecting systems from tampering, protecting students from offensive materials on the internet, and ensuring that students stay with the lessons when things go wrong.

## **2. LAYING THE FOUNDATION**

We realized that bringing the Internet to the participating high schools would be no small feat. After investing the time and money to install four individual Learning Cafés with T-1 lines and multimedia computers, we wanted to protect that investment from harm, be it intentional or otherwise. We also wanted to see our investment produce results: students who learned from our online courses and were able to apply that knowledge. Finally, we realized that the success of this program would depend a great deal on the high school teachers. We determined that to be successful, the Learning Café must be based on a strong software foundation. This software must:

- Manage and mediate the learning environment, with ease of use and administration built-in.
- Protect systems from tampering and minimize maintenance.
- Provide user-friendly, intuitive controls for navigating the lessons and interacting with them.
- Personalize the experience. Give the user choices (but not too many).
- Direct the exploration of the students, filtering the irrelevant and offensive on the Internet.

- Record and report data reliably.
- Facilitate communication and collaboration.
- Deliver the product promptly, reliably, and consistently.
- Provide teacher and administration support.
- Provide for scalability.
- Design open structures to accommodate new content.

We decided to develop this software in three parts: a customer browser, content formatted for the world wide web (WWW) using the hypertext markup language (HTML), and an underlying database.

### 3. THE BROWSER: CAFÉ AMBIANCE

When you bring home a personal computer, it is with the understanding that you are responsible for your own computer. Because of this, the operating system supports a wide range of options enabling you to set up and use your computer however you see fit. In the high schools, however, we didn't want our end users to have all of those options. Some of the students would be computer novices who might find those options confusing and/or distracting. Others might be tempted to customize the environment in such a way that the computer couldn't be used for it's intended purpose (that is, running the Learning Café). If someone did change the settings, we couldn't expect the high school teachers or administrators to spend time re-configuring the computers. We needed to be able to set up the computers once, and then expect that those settings would stay the same from one class to the next.

We decided that we needed a software interface that would simplify use of the computer while restricting the types of activities that were allowed. To answer this need we developed the Learning Café environment, a client application distributed on CD-ROM. This application would be the high school students' interface to the computer: it would launch on start up, and could only be terminated by an instructor who knew the password. It would provide access only to the intended content and other applications needed for the online courses.

#### 3.1. Look and Feel

The designer who created the Learning Café browser wanted to create an exciting metaphorical space that would draw students in and keep them engaged without confusing them with too many unnecessary controls. He designed and built a virtual Café for the



Figure 1. Entering the Learning Café.

project, built from several thousand three-dimensional objects that were texture mapped and ray traced with shadows.

The user enters the Café from the outside (figure 1), a friendly roadstop on the information superhighway winding through the alien landscape of cyberspace. Inside, the user is greeted by a host who asks him or her to sign the guestbook. The user then enters a username (handed out in the first class) and a password of his or her own creation. This username is remembered



Figure 2. Inside the Learning Café.

and used in subsequent interactions with the content, where the browser uses that name to access appropriate lessons and maintain information about the student's progress. If a visitor wants to view the course materials without submitting work, he or she may sign in as a guest.

If the user has used the browser before, the interface provides an option to jump directly to the current lesson. Otherwise, the user is given a tour of the Café, showing the various courses and internet options that are available in the various rooms (figure 2). In the Café, launching an application is as simple as going to (clicking on) a room.

Lessons are served up at a table by the window (figure 3). The actual lessons appear through the window, filling most of the computer screen. The tabletop provides access to a variety of tools for the students. The calculator and notebook provide access to common desktop accessories (Calculator and WordPad on Windows machines). The dictionary provides access to an online dictionary and thesaurus. Students may even save their own set of bookmarks, stored in a common location on the network. This permits students to move from one machine to another without losing their bookmark information. Navigational aids are also provided on the tabletop for flipping through the lesson web pages, accessing other internet options in the Café, and quitting. When the user selects this last option, the screen shows the outside of the Café once again as the browser waits for the next student to login.

### 3.2. Maintaining Control

Upon startup, the browser gets the internet address of the server, locations of shared files, and other customized information from an initialization file. It also sets up a series of tables for encrypting passwords. These tables are



Figure 3. Lessons by the Window.

used for trap-door encryption when a user logs in: the typed password is encrypted, then compared to the value in a password file. If the values don't match, then the password is wrong. This approach prevents others from stealing passwords from a file and the minimizes chances that they'll be able to guess passwords.

The browser then checks the internet connection. If the lessons and/or database are inaccessible via the internet, then the lessons are retrieved from a local source instead. Although records of student performance may not be kept in this case, students may continue to do some work while the server, network, or connection is being repaired.

When students can and do sign in, the browser uses those usernames to identify the students' bookmarks files. Usernames are also passed along to the database for tracking purposes: when the student first accesses a lesson, when he or she takes on online quiz, or when the student chooses to send information to the instructor.

Although many of the lesson pages contain links to informative web pages on the internet, we did not want students to be distracted by surfing early on in their lessons. Therefore in the early lessons (how many is specified in the initialization file) we limit browsing to only those domains referenced by the lesson pages. Later on, when the student has gained a better understanding of this resource, he or she is free to roam the internet without restrictions. The browser maintains a timer that tracks how long the computer is idle. If it is idle for more than a given time period (specified in the initialization file), then the browser closes any windows it has generated and returns to the outdoor scene, waiting for the next student to sign on. This ensures that all students entering the Learning Café will be able to log in from the beginning. It also prevents students from leaving offensive material on the desktop for the next class to see.

#### 4. HTML CONTENT: WHAT'S ON THE MENU

Even the best planned lessons need to change. This is especially true for new or experimental courses, such as the ones we offered, as instructors use student feedback to improve the impact of their lessons. Teaching a rapidly evolving topic, such as computer literacy, and supplying links to an ever changing collection of web resources further compounds the need for flexibility.

We decided that the best way to keep our lessons flexible was to develop them as web pages formatted with the hypertext markup language (HTML) and store them on a web server. Any lessons that changed could be uploaded to the server, making them immediately available to all of the client systems accessing that server.

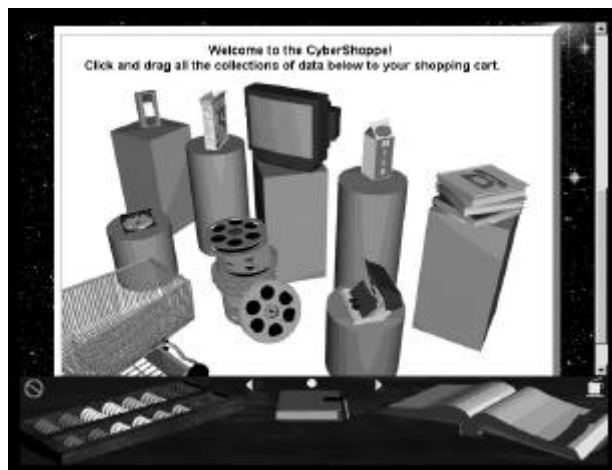


Figure 4. Multimedia activity in the Information Literacy course.

Updates to local copies of the lessons could be easily made by simply downloading those files through a common web browser. HTML, which uses plain text tags, also has the advantage of being platform independent: changing the server or client machines would not necessitate a change in the lessons.

Developing the web pages for the online courses, we strove to maintain a consistent look and feel that would fit well in the context of the Learning Café browser. The designer for this project used a cyberspace theme for the information literacy course, complete with star fields, satellites, and astronauts. He also sought to achieve consistency in the illustrations and multimedia activities that he developed for the information literacy course. Illustrations use three-dimensional computer graphics similar to those in the Learning Café browser. The multimedia activities provide active learning experiences that help to drive home the lessons being taught (figure 4).

## **5. THE DATABASE: SERVICE WITH A SMILE**

Students can learn a lot from online course materials. But in most cases, they are expected to navigate the course materials on their own. For novice computer users, it may not be clear where the student should start or what the student should do next. Students who can figure out what they are supposed to do may choose not to do it all: after all, who's going to know? Even when students do complete the readings and activities for a lesson, they may still not be sure what they should have learned. And without some record of what the students did, it is difficult for an instructor to gauge how much they learned either.

We addressed these problems by building a database to support the Learning Café. A database system, running locally in each of the high school library Café s, serves up customized web pages that contain up-to-date information extracted from the database. We also maintain a mirror site which we used for testing purposes as well as a central repository from which lesson pages could be uploaded.

### **5.1. Dynamic Content**

One advantage of using a database is that a change to a single database field may be reflected instantly in every web page that references that field. A database also allows us to customize the web pages, creating a unique web page for each student (represented by a record in the database). We took advantage of this capability in several ways.

First, we designed a "course" database that defines the content of each course. The number of lessons, and the web pages and online quizzes corresponding to those lessons, are represented as fields in the database with one record for each course that we offer. A "class" database links students and instructors in the various schools to these courses. Thus any changes that we wish to make -- to the order of the lessons or content of the course -- instantly go into effect for all students taking that course. This strategy also makes it relatively easy to add a new course to the Learning Café: we simply add a new record to the database.

Next, we designed a "student" database that keeps track of who is authorized to use the Learning Café, and what courses they are currently taking. A related "performance" database contains one record for each course that a student takes in the Learning Café, storing information about when and how often that student has accessed each of the lessons. The combined key of student and class ID is used to access the appropriate performance record, and the field values therein are used to generate the initial lesson page that a student sees when he or she signs on to the Learning Café. The performance record also contains student grades (entered by the instructor) and links to a "test results" database.

Finally, we designed the "test" database that generates on-line quizzes on the fly.

## 5.2. On-Line Quizzes

Lessons are typically taught in a prescribed sequence; if students miss or don't understand a lesson, they are less likely to learn what they need to from the next lesson. We addressed this problem by developing courses that force students to take a quiz after each lesson.

Each quiz is represented by a record in a "test" database file, which references a sequence of questions in a "questions" file. Although we maintained a fixed set of questions for each quiz in this iteration of the project, this approach may be used to produce customized quizzes for the students so that students sitting next to one another don't have the same quiz. This could be implemented rather simply by using the student ID as a seed for a random number generator, and then using the resulting sequence of random numbers to select from a large set of quiz questions.

Questions may be either multiple choice or short answer. Multiple choice answers are graded automatically by a database script, and the results (including a list of the questions that the student got wrong) are presented immediately. Short answers are stored in the database and later graded by the instructor for the class. The test record indicates a minimum passing grade required for the student to go on to the next lesson; thus the student's multiple choice grade determines what lesson link appears at the bottom of the page reporting his or her scores.

Although we couldn't be there ourselves to ensure that students didn't cheat, we thought that students would be less likely to if they had to take the quizzes in a classroom with a teacher present. Therefore the links to "take a quiz" in the lessons all lead to a web page that says "Sorry, you can't take this quiz outside the Learning Café". Our Learning Café browser (in the classrooms) looks for this URL, and substitutes a call to the database which generates the appropriate quiz. This custom quiz contains hidden references to the user taking the quiz so that appropriate credit may be given when the student submits it.

We further diminished the temptation to cheat by minimizing the significance of the quizzes. Students may take a quiz as many times as they want. Each time a student takes a quiz a new record is generated in the "test results" database. All test results may be viewed by the instructor. Of course, traditional midterm and final exams (given on paper, at a specific time, with a watchful proctor) weigh heavily in the calculation of a final grade.

### **5.3. Gathering Information**

The information gathered by the Learning Café database serves a variety of purposes. A special student account for "instructor" is used to access this information.

Instructors themselves use the Learning Café browser to grade short answers on the quizzes, read student messages, review student performance, and assign grades. They may also customize their class information in the class database. All of this is done with custom web pages generated by the database management system.

Administrators -- and we on the development team -- also use this interface to track student progress and usage of the Learning Café.

## **6. CONCLUSIONS**

It's been just a year since we first installed our software in the high school Learning Café s, and the results are still trickling in. Overall, response of the students and high school teachers has initially been positive. Although we might do some things differently another time around, we find that our basic premises are sound. The Learning Café is open for business.

## **7. ACKNOWLEDGEMENTS**

I am grateful to the rest of the Learning Café team, without whom this project would not have been possible. I am especially indebted to Barbra Higginbotham (project director), Miriam Deutch (project coordinator), Beth Evans (information literacy editor), Sahon Palmer (program officer), and Tony Scarlatos (multimedia designer and developer).

## **8. REFERENCES**

- Arnow, David, and Barshay, Oleg (1999). "WebToTeach: An Automated Web-Based Program Checker". Submitted to *SIGCSE Technical Symposium*.
- Carr, Sarah and Jeffrey R. Young (1999). "As Distance-Learning Boom Spreads, Colleges Help the Set Up Virtual High Schools." *The Chronicle of Higher Education*. October 22, 1999: A55-58.
- U.S. Department of Education, National Center for Education Statistics (1999). "Internet Access in Public and Private Schools." *Indicator of the Month*, February, 1999.
- Wade, Vincent P., and Power, Conor (1998). Evaluating the Design and Delivery of WWW Based Educational Environments and Courseware. *ITiCSE '98*, Dublin, Ireland, pp. 243-248.
- Williams, David D., William D. Eiserman and D. William Quinn (1988). "Distance Education for Elementary and Secondary Schools in the United States." *Journal of Distance Education*. Fall 1988. Vol. 3, No. 2, p.71-96.