

Creating a Useable Peer-Tutoring Site On-Line

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Abstract

A description of the development and implementation of a peer-tutoring service on-line is presented. A model for the student creation of the web site is discussed as well as the ongoing evaluation of software needed by the project. The issue of how to provide tutoring that complements the presentation of course material in the classroom is raised. The assessment of the usefulness of the site is just beginning and much developmental work remains.

Brooklyn College is a four year institution within the City University of New York that serves a clientele in the borough of Brooklyn. It is a wholly commuter school that offers full degree programs during the day, the evening and on weekends. As has been shown over and over again [Cooper and Mucck, 1992], student retention and success is significantly aided by the availability of peer-tutoring. For the past fifteen years, students have been assisted by peer tutors in the college's Learning Center (LC). The peer tutors are students who have previously taken a course, did well and were trained to offer tutoring assistance. The Learning Center is very popular and demand for its services always exceeds its capabilities. Students who attend evening and weekend classes feel particularly shortchanged because it is difficult to find tutors willing to work at those times. The solution to this problem appeared to be the development of an interactive web site that would offer selected tutoring services on-line. So, approximately four years ago, the authors decided to create a web-based peer tutoring site for Brooklyn college.

Original Site Design

The first year of the project was spent mostly in concept development. Our goal was to attempt to emulate the student-centered peer-tutoring environment of the Learning Center as much as possible on-line. We identified as our primary clientele the students who wanted assistance so that our focus was on their needs. The group who did the early concept development was composed of members of the Learning Center staff, tutors, the authors, and Computer and Information Science (CIS) students, all of whom bandied about possible site designs. Content was envisioned to come from master tutors, LC staff who had been tutoring for several years and had extensive experience. Implementation was to be carried out by advanced CIS students, who would work on the site as part of their required senior project. The originally formulated site plan had three aspects:

1. Static information
 - A. Information about the Learning Center
 - B. Tutor schedules
 - C. Content pages for individual courses
 - Frequently Asked Questions (FAQs) developed by the master tutors
 - Content such as graphic organizers, summaries and outlines
 - Links to faculty pages
 - Links to outside tutorials
- 2, Asynchronous interactivity
 - A. e-mail your tutor
 - B. Search a course database
 - C. Submit sample coursework
 - D. Take sample quizzes
3. Synchronous interactivity
 - A. On-line tutoring sessions - scheduled in advance
 - B. On-line review sessions

The easiest part of the site plan to implement was the static information, but steady progress has been made on each aspect.

The Learning Center at Brooklyn College offers assistance in many of the college's courses. Early on, however, it was decided to concentrate the development of the web site on the ten courses in the Core curriculum that every student must take.

Implementation

In the second year of the project, Fall, 1999, implementation of the site plan began. The administration offered a dedicated server for the web site on the college's Unix network with large disk drives to hold the extensive database information that we expected to develop. The first static pages were developed by a CIS undergraduate who subsequently became the webmaster for the site. The current version of the initial site page is shown in Figure 1 [http, lc]. From the start, we implemented extensive testing of our work by conducting reviews by various parties. The first review level was the authors, followed by the Learning Center staff and tutors. When appropriate, interested faculty members are asked for input and finally the pages are piloted to students.

Software Selection

The basic web pages are programmed in HTML. The creation of the web pages is done by CIS students in any way that they choose. All of our students are already familiar with HTML by their Junior or Senior year and no further training by is necessary to work on the project. The choice of the database was dictated by the computing center. We were originally informed that Oracle would be available for use, but the site license was not obtained. Instead we are using MySQL [http, mysql], an open source SQL database system, that the college had installed for use with Blackboard [http, bb]. We needed to decide how to offer interactive activities on a web page and to access the database. Several CIS students did a side project of evaluation and ease of use for several proposed methods of access, the scripting languages Perl or Php, java applets or javascript. All the students involved implemented an on-line questionnaire whose results were to be deposited into a file for later analysis. The decision after a semester long project was to use Perl. Currently, another alternative for collecting on-line responses is being evaluated, the Adobe PDF language [http, pdf] coupled with a PDF editor.

Static and Asynchronous Interactivity

Co-incident with the creating of the general Learning Center web pages, a master tutor was asked to develop content for static pages and the database for Core Studies 1, "Classical Origins of Western Culture". The tutor developed FAQs, summaries of texts read in class, database information on all the major persons that occurred in the texts and study hints for students. All this information was transformed into web pages or database entries accessible through the web page. Our internal review was complete by the middle of the Spring, 2000 semester and we invited the faculty who teach Core Studies 1 to review the tutoring web site. While applauding our efforts and goals, the faculty were very disturbed by the content. The content was no different than what a tutor would discuss with a student needing help, but the interaction was no longer one-on-one. The faculty felt that we were providing too much information to everyone, undermining their classroom actions and making it unnecessary for the students to think about the subject matter.

How to Assist On-line

The summer of 2000 was spent in much consideration of what information could be provided on a tutoring web site where our purpose is not to replace an instructor but to assist students who were having trouble and needed extra help. After much discussion we decided that faculty had to be

involved from the beginning even though the site was for a peer-tutoring center. At the suggestion of a CIS graduate student, we switched content development to Core Studies 5, "Introduction to Mathematical Reasoning and Computer Programming." We also changed the approach of providing information to a Socratic format where students are guided through the programming examples by questions. Such a presentation is shown in figure 2 from the Learning Center web site [http, lc]. Should the students be provided with the answers to the questions? Currently, the site does not. Instead it suggests that the students e-mail their tutors if they can not answer the questions. Keywords that correspond to database entries are highlighted and the student can click on them for more information. The initial programming web pages were completed early in the Fall 2000 semester and sections of Core 5 students were asked to use and review the site. On-line and in-class questionnaires were distributed to the students. The Cores Studies 5 site had the following features:

FAQs

- static programming examples with questions
- access to the database via keywords
- navigational tips to assist the student in moving around the site
- e-mail your tutor ability

Student Responses

Approximately 120 students completed questionnaires about the web pages out of about 360 students enrolled in sections of Core Studies 5 in the Fall, 2000 semester. While all instructors were asked to hand out the form in class, only one instructor did so and none of her students had accessed the site. The majority of responses came on-line and were not necessarily limited to students taking the class since anyone investigating the site would have found the questionnaire. The questionnaire that was used is shown in Figure 3. One instructor gave his students an inducement, extra credit on a quiz, if they completed the form on-line. That of course skews the results for statistical purposes, but nevertheless, the student responses were found to be very informative. Our fear that students would dislike the quasi-Socratic example/question format proved to be untrue. Student comments indicated that independent learning was taking place. Most students just said yes to the question of whether the examples were helpful. Those who did leave comments, made statements such as, " I needed the book and the class notes to answer the questions", "the examples were helpful" or "I used the class notes to answer the questions". Only two students asked for answers to be provided on-line, though several suggested that the questions be made easier. Most of the student comments focused on the appearance and navigation of the web site. In particular, many students, ~50%, objected to the color of the background. Others felt that the two frame format was hard to view on their small screens at home. Still others felt that navigation could be made more easy. The largest number of comments were requests for web pages on more courses and more content. Several students were impressed that the web site had been created by other students. We were surprised that no mention was made about accessing the database via the keywords or e-mailing your tutor. Perhaps the former just worked well and the latter was not found to be necessary. We found the comments to be very useful and have made changes in response to them.

Synchronous interactivity

Choice of software is very important to providing interactivity. The on-line tutoring sessions were envisioned as being special cases of chat sessions. Two major pieces of software were considered. One was commercial, Blackboard [http, bb], which the college licenses and uses in web-based courses and the other was a locally developed application written by two CIS students as a senior honors project. The latter was written in Java and during testing of it in the summer of 2000, it was found that many home users would not be able to run the chat client because of the swing libraries that were used. A graduating senior and former student rewrote the software for us to use older Java libraries. During the Fall, 2000 semester, we tested using Blackboard as the chat software. Simulated tutoring sessions were held in which the participating students were the peer tutors at the

Learning Center. The same problem that had occurred with the local developed software occurred with tutors who accessed the internet via AOL [http, aol]. AOL was contacted and provided a patch, but the tutors still had great difficulty with the Blackboard chat client. Beyond the technical difficulties, the tutors found the on-line format to be very different from in-person tutoring. While talking is straightforward for most of us, typing responses to questions proved to be very arduous and error prone. The consensus of the tutors who participated was that they would prefer using the chat software for review sessions where they could prepare the information to be provided ahead of time and where the real time questions/comments be kept to a minimum. Internal discussion of this issue continues and the question of the appropriate software has not been resolved.

Future Developments

In the Spring, 2001 semester, development of web page content continues for an additional two core courses, Core Studies 3, "People, Power and Politics," and Core Studies 7.2, "Science in Modern Life: Physics." The particular courses were chosen because of the responsiveness of the faculty who teach these classes. The model that we are evolving to facilitate the adding of new content is to pair a CIS undergraduate working on a senior project with a master tutor for the course. The two work closely together to design the appearance and the content of the pages. Oversight is provided by the tutor manager. New ways to carry out tutoring are discussed at group meetings and input is solicited from the larger community at Brooklyn College. Ease of use is always a major concern [Venkatesh and Davis, 1996; Mahmoud, Burn, Gemoetas and Jacquez, 2000). As more content is added to the web site, focus groups of students in the targeted courses will be formed to evaluate more thoroughly the usefulness of the site. While the goal of providing 24/7 tutoring for all the core curriculum courses has not been fully achieved, much has been learned and the web site is viewed as an ongoing experiment that can only become better with time.

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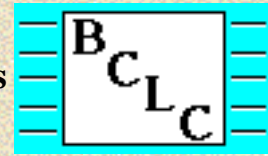
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Programs

```

Program assign1;
var x, y ,z : integer;
begin
x := 15;
y := 4;
z := x * y;
z := x - y;
z := x + y;
end.

```

Self-help questions

Please answer the following questions which will assist you in your understanding of the program. If you don't understand the questions or can not answer them, please see or e-mail a Core 5 tutor.

1. What are the values of z for each statement?
2. Did x and y ever change their values after they were assigned to 15 and 4 respectively?
3. In an [assignment](#) statement, which variable, either on the left hand side or the right hand side of the " := " has its value changed?
4. For a `a := b` which variable is assigned the value of the other?
5. Let x be 15 and y be 4. If we have `x := x + y`, what is value of the [expression](#) on the right hand side of the " := "? Which variable is on the left hand side of the " := "? Then, what is the value of the variable on the left hand side of the " := " going to be?
6. Thus, why is the statement `x := x + 2` called an "assignment" statement?
7. So `x = x + 1` does not make sense for a non-programmer. But does `x := x + 1` make sense to you, as a Pascal programmer?

BACK

On-Line Learning Center

Questionnaire 1

1. Were the program examples helpful in understanding covered material?
 2. Were the questions that followed each program example easy to answer?
 3. Did you understand what the questions were asking?
 4. To answer these questions, did you need more information than what was provided in both classroom and textbook?
 5. Did these questions help you understand some material better?
 6. Should the format in which questions were presented stay or go? Why?
 7. Do you have any additional comments or suggestions about this studying aid?
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