THE VIRTUAL CORE: DISTANCE LEARNING, BROOKLYN STYLE

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【Abstract】

Educators nation-wide are experimenting with the use of technology to enhance undergraduates' academic success. Brooklyn College, part of the City University of New York (CUNY), has developed a sequence of general education courses that join one-half class time with one-half Web-based instruction—a fresh, inventive model that gives students the best aspects of both the traditional and the online educational experience. As a result, Brooklyn's core curriculum has become more inviting, effective, and activity-based. The grant that supported this project was written by Dr. Barbra Buckner Higginbotham, Chief Librarian and Executive Director of Academic Information Technologies, and this major faculty training and development effort is occurring under the aegis of the Library.

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Educators nation-wide are experimenting with the use of technology to enhance undergraduates' academic success. At Brooklyn College, we are creating an imaginative hybrid approach that addresses the issues far more effectively than using technology as either (1) a simple add-on, or (2) a radical replacement, for the traditional classroom experience. Instead, we have developed general education or "core" courses that join one-half class time with one-half Web-based instruction—a fresh, inventive model that gives students the best aspects of both experiences. As a result, our core curriculum is becoming more inviting, effective, and activity-based, and all the established benefits of the liberal arts college experience are retained. Imagine this scenario:

It's 9:00 PM and Jane Lee's house is still humming. The campus is only a couple of bus stops away; 20 minutes later, Jane is logging onto a PC in one of the college's 24-hour student labs. She decides to work on her assignment for Core Studies 8.1, Biology. She begins by logging onto Prof. Blamire's Web site and reading his message about how to approach the next class. Then, she checks in on an on-going class discussion on the topic. After reflecting for a moment on the range of views expressed, she realizes that an important point has been overlooked. She accesses some additional information from the Web that supports her point of view, then composes a short paragraph and adds it to the discussion for others to consider.

Jane moves over into a comfortable chair to read a chapter from the course textbook and make some notes. In a little while, she returns to the computer to complete a pre-test on the topic and assess her progress. She wants to review a part of the lecture she missed last week because of illness. She clicks on a screen icon and Prof. Blamire appears in a
small window, summarizing via digital video the materials she missed.

After a soda and a chat with a friend who's also taking a break, Jane decides to catch up on an exercise she and her bio lab partner are working on. Back to the computer! On a single screen are three windows: (a) the lab exercise; (b) the objective; (c) a biological simulation which recreates the "wet lab" exercise. She investigates a mutation in the genetic code--finds a new twist--explores more deeply--and it's midnight before she realizes what time it is. Jane decides to compose a message to a student in her class with whom she's become friendly, and call it a day. Tomorrow morning, when she feels fresher and before she starts her part-time job in the college library, she will return to finish up those exercises--and perhaps start working with the unit on Mendelian genetics that links with her Core history class.

BACKGROUND

Part of the City University of New York (CUNY), Brooklyn College enrolls 15,000 students, 10,000 of whom are undergraduates. Our diverse student body mirrors the Borough's many ethnic groups. The College is well-known for its interdisciplinary Core Curriculum, required of all students and cited as "a bright spot in American higher education" by the National Endowment for the Humanities. (Cheney) This ten-course sequence provides a common intellectual experience for all students and serves as a foundation for advanced study.

In 1995, Brooklyn College elected to merge the Library and academic computing under the direction of Dr. Barbra Buckner Higginbotham, Chief Librarian and Executive Director of Academic Information Technologies. Quickly, the focus of Academic Information Technologies (AIT) became Web-assisted teaching. Three partially virtual Core courses were developed and piloted in the 1997/1998 academic year. The response from students was so positive that, working with Biology professor and multimedia specialist Dr. John Blamire, Dr. Higginbotham submitted a successful proposal to the U.S. Department of Education's Fund for the Improvement of Post-Secondary Education (FIPSE) for funds to develop partially virtual versions of other Core courses. This article details the Virtual Core project's first year.

WHY LEARN ONLINE?

The Virtual Core project is designed to address and remedy a number of interrelated problems common to undergraduate general education programs throughout the country:

Learning is a dynamic process. Passive listening is not enough: students must actually do things, in order to master and appreciate the subject matter. Unfortunately, today's fiscal climate has caused colleges to rely increasingly on large lecture classes, reducing or removing many occasions for active learning. Such economies remove valuable opportunities for discovery and problem-solving, causing students to falter.

Many students (especially those for whom English is a second language, members of under-represented minorities, and some women) are initially apprehensive about college. Negative feelings can translate into poor performance and diminished learning. Students may not ask the questions, build the bonds, or learn the material necessary for success. A reform that lessens anxiety, improves academic success, and creates excitement about learning is a valuable one.

Many students' personal lives exert great pressure on their academic careers. In CUNY, 45% of the candidates for bachelor degrees are 25 or older. This trend finds older students busy with jobs and families as well as school. A Core curriculum that offers flexible study--work that can be completed according to the student's schedule, rather than the college's--expands academic choices, making a traditional liberal arts education more attractive and more manageable.

College faculty across America are seeking ways to address these issues, often by using technology to support teaching. Today, two models predominate. In one, technology-based modules supplement conventional classroom activities. In the other, class time has been completely displaced by courses delivered via technology. We believe that Brooklyn's "one-half in-class/one-half on-line"
model provides sounder solutions than does either of these approaches.

IS DISTANCE LEARNING BETTER LEARNING, OR JUST DIFFERENT LEARNING?

It is unnecessary to rejustify traditional classroom teaching methods (lecture, discussion, laboratories): it is enough to say that these are well-tested approaches to education, and the majority of faculty continue strongly to believe in them. Active involvement with instructors benefits students, and one need not throw out the baby with the bath water - completely discard the classroom experience in favor of an asynchronous electronic one - in order for students to reap the benefits of technology-assisted instruction.

One might also ask, why should class time be reduced at all - why not use Internet modules merely as supplemental homework tools? In our experience, effective modules demand more time and interaction than students already spending three hours a week in a classroom can manage. Students are less likely to perceive the Internet work as just another burden (and therefore to neglect it) compared to the work of other classes they are taking, when there is a trade-off in class hours. Most importantly, while lecture is useful for some things, hands-on learning is better for others. The Virtual Core project is determining which aspects of a class can be most effectively delivered in-person and which on-line, and developing courses that allow students to achieve maximum academic success in classes combining the two in productive proportion.

The key question becomes, what causes us to think that Internet components will lead to better learning, particularly when combined with the classroom experience so that those elements of on-campus learning so clearly tied to student success are preserved?

Brooklyn psychology professor Louise Hainline observes that "the data on the effectiveness of lectures compared with other methods of teaching suggest that while lecturing is an efficient method delivering information to students, it does not excel in terms of other indices of learning such as retention, transfer of information to new situations, or measures of problem solving/thinking." One study found that after a lecture students recalled 70% of the material covered in the first ten minutes, but only 20% of the material covered in the last ten. This suggests that effective adjuncts to lecture are welcome - especially those that promote more active learning.

In one of the most widely read higher education articles of 1995, Barr and Tagg suggest that the primary purpose of colleges is to "produce learning," rather than to provide instruction, and that traditional teaching is only one of many means to cause learning to occur. Ideally, lectures, laboratories, and technology-assisted elements will complement one another, each strengthening the whole that is the course. Good technology-assisted components promote a high level of interaction between the student and the subject material, favoring both the quality and quantity of learning.

Developmental psychologist Lev Vygotsky characterizes the role of the teacher as one who helps build a "scaffolding" for the learner, arranging materials so that the he or she can take the next steps independently. In line with this thinking, Internet-based course components can provide students a framework for the examination or investigation of a topic, while faculty continue to offer guidance and support in the classroom.

With Internet modules, the penalties imposed by time (either the hour at which learning must occur or the time allotted to accomplish an assignment) are removed, as are associated pressures. Students can direct their own education, moving as slowly or as rapidly through material as their needs and abilities dictate. They can prepare their thoughts in advance and turn to their studies when they are intellectually and physically fresh, improving their performance.

Internet modules also promote more student/student and student/faculty interaction. As Kenneth Bruffee, authority on collaborative learning and a member of our faculty suggests, computers can be used to facilitate conversation among students. When students talk with the instructor and with each other online, this fosters a sense of
The learning process is one of discovery in which students come to conclusions as a result of inquiry and analysis.

Technology-based modules integrate coherently and smoothly with classroom lectures and laboratory exercises; they incorporate shared themes and methods of exploration.

Modules stimulate student-to-student and student-to-faculty communication.

Internet components explore innovative ways of presenting topics.

So that students reap the benefits of self-directed study, the modules are designed to enable learners to interact with them in informal settings, at their own pace, and at times of their own choosing.

Non-linear pedagogy and hyperlinking are used to create learning tracks that enable students to individualize a course, exploring its components at their own pace and developing personal methods of discovery.

PROJECT DESIGN

Through an application process in the fall 1998, Professors Blamire and Higginbotham solicited faculty developers for the Virtual Core project from those seven of the ten Core courses for which Internet modules had yet to be developed. During this same period, Academic Information Technologies (which reports to Prof. Higginbotham) created an Academic Support Team to provide ongoing assistance for development efforts. Team members train and support faculty in their use of the Web course authoring platform; provide customized programming; arrange copyright clearances; and supply the more advanced features that some faculty wish to incorporate. An evaluator was hired, and has begun designing appropriate assessment tools.

In the spring 1999 the Faculty Mentors worked intensively with the 14 faculty selected for the project, to redesign significant portions of each of the courses for the Internet environment. Using equipment, software, and Web connections provided by the College, Faculty Developers began to create a number of Core course modules for Internet delivery. Under the guidance of the Faculty Mentors, they met bi-weekly to explore common underlying themes.
and teaching techniques; determine those aspects of the courses that lend themselves best to Internet delivery; ensure that each module develops skills that will carry over from one Core course to another; and explore how Internet components can be integrated smoothly and coherently with traditional lectures and laboratories.

Course development will continue in the fall 1999. To generate information permitting a solid evaluation of Core courses involving significant Internet elements, for each of three semesters (spring 2000, fall 2000, and spring 2001) students will be preregistered for the Internet-enhanced sections of the seven Core courses to be offered, and another group for an equal number of un-enhanced sections (the control group). In the spring 2000 we will offer the Core courses with the new Internet modules for the first time, employing assessment tools for faculty achievement, student success, and student satisfaction. Graduate Assistants who are content specialists will assist students working with the Internet modules in various campus locations. They will also manage, spur, and refocus online discussion. Library and computer lab staff will assist students with Internet module access.

At the end of the semester, the Graduate Assistants will partner with the Faculty Developers to assess the student learning that occurred as a result of the Internet modules and modify the Internet components as experience dictates.

RESULTS TO DATE

In the spring and fall 1998 Brooklyn College piloted three courses using the one-half in-class/one-half on-line model. Based on what they have learned as teachers of their own courses and lurkers-with-permission on the other two, the faculty teaching these sections report that the partially virtual format is proving to be a very strong one. A review of these courses' features gives a good idea of the effectiveness of approach and strategies, how the modules work, and how faculty ensure that students fulfill their Internet assignments, rather than effectively "skipping class" once a week.

CORE STUDIES 8.1: SCIENCE IN MODERN LIFE: BIOLOGY (PROF. JOHN BLAMIRE)

<HTTP://WWW.BROOKLYN.CUNY.EDU/BC/AHP/BIOLOGYCORE.HTML>:

The Core Biology Internet component includes a Web site with a virtual laboratory as well as channels for student-faculty communication, quizzes (enabling students to gauge their progress), animation (molecules actually react!), and many other features, any of which can be modified and adjusted as the need arises. Using video, sound, animation, graphics, and audio (including the voice of the instructor) the site provides a complementary view of the subject, one seen neither in lecture nor the textbook. The virtual lab or Science at a Distance component includes bio-simulations that supplement wet lab experiments (students conduct analyses on the Web and derive conclusions), as well as elements that allow learners to investigate catalysis, activation energy, and the rôle of enzymes. In the V-lab students examine hundreds of data points, rather than the five or so that are possible in a physical laboratory: these nondestructive (no broken glass!) bio-simulations allow investigations that would otherwise be impossible.

In one of Prof. Blamire's Web-based assignments, students form small four-person teams. Each team is given a topic, such as "cancer in humans." Every member receives an individual assignment (for example, the nature of mutations) which she or he researches using the Web site and its links, printed literature, and the textbook. The results (a few paragraphs) are posted to a news group for all students and instructors to read. The postings are then critiqued online and rewritten. Next, teams use Web-based bio-simulations to generate data (such as cell growth), plot graphs, and formulate conclusions. The complete assignment package is combined into a portfolio and graded by the instructor. Each team leader gives an in-class presentation of the group's results. These assignments run for approximately four weeks each; there are two to three of them each semester. Each student also completes a program of
At the same time, Brooklyn's model does not require that courses be stamped out with a cookie cutter: Prof. Hansen adds that the particular focus of the weekly discussions depends very much on the individual instructor's approach--one of the reasons why colleges and universities have various people teaching a course in the first place.

CORE STUDIES 4: THE SHAPING OF THE MODERN WORLD (PROF. DONALD GERARDI)

Prof. Gerardi discovered just a few weeks into his first term teaching Internet-enhanced Core 4 that technology helps to make students much more active learners:

It encourages (indeed requires) them to reflect on lecture points and materials at their own pace and then to share their understanding with other students as well as with me. In the past I have tried several techniques to get students to interact with readings and with each other. I interrupted lectures to ask questions to get reactions and test for comprehension. I took class time to group students into discussion groups to interpret sources and develop writing assignments collaboratively. The results were never encouraging. None of these techniques worked as well as what I am doing in this web-based course.

As an example, for Lecture Topic IV, "Markets, Hierarchies, and Images of Power," Prof. Gerardi combined what would have been two class lectures into one, part in-class and part as a virtual class online. In the past, a few students (perhaps 15%-20%) would contribute comments on the slides or answer questions he raised about sources. But online, he found he had 90%-95% participation, with students posting to the forum after working through the illustrated part of the lecture. In addition, the assignment had them comb difficult original sources in the course collection to find captions for some of the images, showing them the connections between two types of primary sources and illustrating how historians might use different media in reconstructing the past. "It's my judgment," Prof.
Gerardi says, "based on thirty years of teaching history, that to accomplish all those objectives in the traditional way would have taken at least two weeks instead of one, and with less evidence that the students had actually done the work!"

**PROJECT PRODUCTS**

The *Virtual Core* project will generate a cluster of Internet modules useful for undergraduate general education courses. The project's chief tangible product will be a faculty development "road map" for building Internet-assisted course components. A kit, available via the *Virtual Core* Web site, will offer other institutions a step-by-step guide for designing their own program to develop Internet modules. This contribution is of critical importance: the use of technology for teaching is a "hot topic" today, but often schools either lack the funds for experimentation, or begin then founder. Other institutions will benefit from the ability to acquire an established faculty development program, one that says, "If you do it this way, it will cost this much, and it will work." Since almost all colleges and universities require core sequences, our virtual kit (designed to be usable at any institution) will have considerable impact: our project will make the transition to quality technology-assisted teaching easier and more cost-effective for peers at other institutions.

**EVALUATING OUR SUCCESS**

An external evaluator is collecting and analyzing data intended to determine whether the goals of the *Virtual Core* project have been met. While we are more interested in quantitative markers of progress, we have also included qualitative measures of program effectiveness, including pre- and post-assessments of attitudes toward course content, student expertise and comfort in using technology, and so forth. Added to this analysis will be subjective measures of student and faculty opinion of the modules, their impact, and their design.

**PROJECT RESULTS**

The *Virtual Core* project is already producing valuable results in four key areas:

1. **Results for Students.** Students' writing skills are improving. Student satisfaction and success in the Core curriculum (and thus with the initial college experience) are increasing. Students have greater flexibility in meeting their educational needs and feel more fully a part of a community of learners.

2. **Results for Faculty.** Our project is giving faculty the opportunity to explore and develop new approaches to teaching, without abandoning those they now use and to whose power they remain committed. They are developing fresh instructional skills and increasing their base of knowledge about technology-assisted learning, discovering which aspects of their courses lend themselves best to Internet delivery. They are finding new rewards in the closer relationships the Internet modules permit them to develop with their students, and the increased vitality and effectiveness of their teaching. Like students, they have greater flexibility in meeting their academic obligations.

3. **Results for Brooklyn College.** Our one-half in-class/one-half on-line model has the effect of increasing the number of classrooms on campus. When virtual labs substitute for some laboratory time, the same result occurs. On campuses where there is considerable faculty reluctance about asynchronous education, a model where the classroom experience continues to predominate has a better chance for faculty acceptance.

4. **Results for the Postsecondary Community as a Whole.** Our faculty development program for Internet-assisted learning can save other schools the time and expense of experimentation that often ends in failure, assuring them of Brooklyn's success. The measurement and evaluation processes for good teaching, student success, and faculty/student satisfaction in the Internet-assisted environment should also be broadly useful.

**EXPORTING THE VIRTUAL CORE TO OTHER SETTINGS**

The *Virtual Core* project has strong potential for implementation in other institutions: most colleges and universities have basic education requirements, making the concept of Internet modules for such courses of interest to educators from community
colleges through post-baccalaureate institutions. The curricula and techniques developed are transferable to any setting, whether an institution's environment is an urban or a rural one, whether it enrolls 30,000 students or 1,000. As the new courses are developed, we will freely make their sites available, as we do the three existing courses. Our Core Curriculum turned all eyes on Brooklyn when it was introduced in 1981. Similarly, we expect that the Brooklyn Model for Web-based learning will generate like excitement in the world of higher education.

References


