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Our enthusiasm for developing computer-assisted educational methods and techniques must be tempered by the realization that large numbers of students lack even the most basic computing skills and abilities at college entry. Minority students and women of low socioeconomic status are particularly susceptible to academic failure when they are ill-equipped to deal with faculty demands for technically assisted coursework. Underlying cultural and economic reasons for these "deficiencies" are explored here, along with descriptions of courses developed to assist technically underprepared students who may be "technophobic" or otherwise resistant to the use of computers in the classroom.

Classism and Lost Opportunity:

Addressing the Unintended Outcomes of Campus Computing

Linda paused at the doorway for a brief moment, struck by the predominance of white folk and Asians in the room. Filled with intimidating computers and the sounds of clicking keys, the lab seemed a strange and unwelcome environment. She had no idea where to begin or how to ask for assistance. It was all so depressing.

Three of Linda's instructors had insisted that she use a computer to complete academic tasks: writing a short paper, accessing a test and answering the questions on the C-span (whatever that was!), and tracking down some obscure author on the MLA CD-ROM.

When she timidly approached the lab assistant, who seemed to be guarding the room, he seized her student ID and told her to "go find an empty computer station." She spotted one over in the far corner and headed toward the table.

Linda never made it.

Suddenly it hit her. She just didn't belong here. Everyone else knew what to do with the computer. She didn't even know what key to hit first. What if

she turned the machine off? She would look so stupid in front of all these people. No way was she going to do that.

Linda wheeled around and beat a quick path back toward the door, grabbing her ID card from the surprised attendant as she exited. She'd find some other way to do the assignments, or just not complete them at all!

This type of scene is all too familiar to students of color and to many women of all races in our colleges and universities today. A disturbing proportion of these students are "technophobic," unable to engage themselves easily in the academic enterprise because, through no fault of their own, they lack the background and skills to complete computer-assisted assignments. They enter college unfamiliar with the use of these powerful information tools and, absent some way to catch up with their peers, find it difficult to compete in the classroom or the job market.

This article explores the nature of these students' lack of computer competence, which serves as a significant barrier to the successful pursuit and completion of an academic program. Colleges and universities unwittingly contribute to these students' academic failure by failing to recognize the severity of the problem or doing anything about it. The net effect of this inattention is to promote economic classism by increasing the disparity between technologically adept middle/upper class students and technologically underprepared students from low income backgrounds and underfunded schools.

The article also addresses the growing use of technology in the classroom and the workplace, as well as the significance of racial and gender differences in students who are technically proficient and those who are not. It underscores the failure of higher education to address technology gaps between classes of students and the effects of this technology disparity on learning. Finally, it describes an interdisciplinary course designed to narrow the gap between underprepared, even technophobic students and the rest of the student population.

Growing Uses of Technology in Higher Education

Currently, the state of computing on most college campuses is in a transition mode. The past ten years have witnessed an explosion in the application of computers and related technologies in the college classroom. Computers in faculty and administrative offices are commonplace. Microcomputer work stations continue to proliferate across campus communities. Campus-wide

communication networks such as Case Western Reserve University's CWRUNET link the campus's microcomputers together into a vast information web providing increased access to shared computer systems and massive databases both on and off campus. The rich information environments provided by these networks change the way that faculties teach and students learn.

The most recent inclusion in this overhaul of learning has occurred in the humanities, especially in the arts and music, but also in education, psychology and history. Faculty have found that their traditional methods of lecture recitation, library research, and group projects can be accomplished in vastly different ways with the application of the new information technologies. At Case Western, for example, a new electronic library facility provides enormous storage of text and graphics without the library's usual labor-intensive maintenance costs. Electronics also promote more immediate revision of textbooks and access to current research data.

Many universities and colleges now require entering students to bring their own computers when they enroll. Other institutions, like Reed College in Oregon, provide students with a computer that is linked to the college's computer system. Case Western and Carnegie Mellon University install a chip in each student's computer that allows them to access the university's main computer system.

The presence of all of this technology has resulted in a change in student performance expectations. No longer is it acceptable just to type a paper. Students are required to correct their writing mechanics, including spelling, grammar/syntax, and paragraphing, to use graphics presentations, and to master spread sheets in order to manipulate data. All of these expectations require mastery of information technology tools. It is no longer sufficient to conduct a thorough research project using a single data base, usually the home library. Faculty expect students to demonstrate evidence of having searched multiple databases on Bitnet or Freenet for even the shortest research papers.

Students who are familiar with computers and with accessing information from them can take advantage of these new information tools and resources. Students who are biased against the technology or lack familiarity with it have difficulty meeting the faculty's performance expectations. These students are much less likely to produce quality work or to enrich their own college experience because they lack the knowledge or tools to do so. Tragi-

cally, they cannot compete with those peers who have grown up using computers to access databases, prepare documents, and complete classroom assignments. As Paul Resta (1992) writes: "Unless the present trend is reversed, these students are in danger of remaining a class of information-disadvantaged students" (p. 120).

The Significance of Racial and Gender Differences in Technological Preparation

Two popular notions about the computer competencies of college students should be examined. First, it is generally assumed that all traditional-aged college students are computer literate. After all, computers have been a focus of education in K-12 systems for over a decade. Some college students have had access to computers and related computer education from kindergarten through high school.

Another largely unexamined assumption is that the families of most pupils have sufficient incomes to purchase computers for home use. And all too often, college and university officials undertake educational planning with the mistaken assumption that all students value computers and want to learn more about how to use them.

The facts speak otherwise. An Educational Testing Service Survey conducted in 1993 disclosed that minority K-12 students were considerably less skilled in computer competencies than their white counterparts. In particular, Hispanic and African-American students registered fewer computer competencies than their caucasian peers. Of 2,100 schools polled around the country, those with large enrollments of minority students were more than three times less likely to have computers available to their students than those with predominantly white student populations.

In addition, the survey revealed that most computer instructors are white. The predominance of white role models in computer education classes adds to the challenge of involving minority students with the use of technology in the classroom.

Statistical evidence from the study also demonstrated that the average income of families able to purchase a computer for the home is $35,000. The average incomes of African-American families ($16,786) and Hispanic families ($19,027) polled were well below this threshold of affordability. It is also unlikely that lower-income ($22,500) caucasian families could afford to purchase a home computer.

This research indicates that minority and lower income pupils have less access to computers at home or in the schools, have fewer opportunities to experience computer education and, of course, have little chance of being able to practice on computers in their homes. It also strongly supports the assertion that, in sharp contrast, caucasian students from middle and upper income families are more likely to exhibit high levels of computing skills upon entering college.

A second myth about computer competency skills concerns the nontraditional college student who returns to complete an interrupted college program. In many cases these students graduated from high school just as computers were being introduced into the classroom environment. Many of them exhibit poor computer skills. Those competencies which they have learned are often the product of job training programs that focus on the basic and the applied. For many nontraditional minority students, current skills are a reflection of the entry level positions they have filled in nontechnical companies and organizations. Some word processing skills may have been mastered, but the ability to generate spread sheets, implement programs, design graphics, or access the vast resources of internet have not.

Another factor also influences the ability of these underprepared students to gain computer competencies. Many are simply not anxious or motivated to learn how to use the technology. Mary Stickles' (1988) comprehensive research on minority attitudes toward technology suggests that many students of color and many women still view the computer as a "white man's power tool." Many prefer to purchase televisions, video recorders, answering machines, faxes, or home entertainment systems rather than computers. Obviously, not all cultural groups share the same fascination with the technology.

University/College Computer Programs

There is little evidence that many colleges or universities acknowledge the vast deficits in technology skills that minority students and lower income students bring to the college campus when they enroll. In fact, according to Neff (1987), very few institutions even consider the technological needs of such students. Failure to acknowledge the special requirements results in inappropriate computer education pedagogy. Additionally, inadequate provisions for accessing computers on campus limits these students' experiences with computers. Finally, a general failure to recognize and address students'

cultural biases about computers contributes to the likelihood that they will avoid becoming familiar with the technology.

Lessons Learned at One College

Epstein (1994) described a successful new computer technology program targeted at minorities and low income women at Hunter College. She characterized most college programs as based on a white male competitive model taught by white male instructors. Where the preferred pedagogical approach uses lecture recitation, individual laboratory practice, multiple choice testing, and intense individual competition for grades. No effort is made to overcome students' fear or cultural bias about the technology. This pedagogical model is inconsistent with the accumulated research on the learning styles of minority and women students.

Of all the school programs examined and reported on in academic journals, Epstein's discussion of her computer processing program at Hunter College deserves particular attention. A professor of computer technology there, Epstein instituted a course in basic computer technology because the students at the college were deficient in those skills. Her stated purpose in organizing the course was that "The course would provide fundamental computing skills to entry-level students, support their academic development and portray science and technology in a more human context."

Hunter has a large enrolled proportion of women (73 percent) and a significant number of minorities (46 percent). However, the course was not originally designed to address the specific technological needs of minorities and women, but all the students. This point is important because Epstein and the faculty and graduate students who designed and instructed the classes in basic computer skills did not address the specific learning needs of the minorities and women who enrolled. The computer course is taught very much like traditional computer classes, using a "demonstrate, practice, and test" pedagogy. Homework accounts for 40 percent of the grade, and test scores make up the rest. Students writing about the course said, "I would recommend this class to friends but only with the understanding that they have to work extremely hard especially if they do not have access to a computer other than the lab's" (p. 48).

At the conclusion of the course, the 100 enrolled students rated their own computer knowledge. About one-fourth felt their computer knowledge was still weak; 69 percent rated their knowledge as average; and 7 percent de-

scribed their knowledge as expert.

Over 15 percent of the class dropped the course in the beginning of the semester. Another 11 students dropped out later or did not take the final examination. A number of the dropouts could be characterized as technophobic students of color and women. Epstein wrote, "We learned not to underestimate technophobic students. They were fearful."

Despite problems with pedagogy for minority students and women and the challenge to faculty and staff to overcome the students' technophobia, Hunter College continues to support the program. The course now has an enrollment of over 1,000 students, and the college hopes to double that number in the next year.

There is compelling evidence that women and minorities learn best in collaborative environments. Demonstrations need to be supplemented with mentoring and illustrations of how computers can be used in research and in other employment applications. More minority and women faculty are needed to serve as role models and mentors in these settings, as suggested by Cole and Griffin's study (1987) at the Wisconsin Center of Education Research.

Accessibility of Computers

Because so many minority students do not have home computers, they must learn to use the technology and practice it in labs located on campus. These labs are disproportionately staffed by caucasian and Asian men who, too frequently, are technically adept but are poor interpersonal communicators, and they use terminology and jargon that is unnecessary and intimidating. Very often these attendants do not seem to be trained or oriented to assist other students. They do seem to do a good job of servicing the machines, which may, unfortunately, be the primary criterion for their performance appraisals.

Campus computer laboratory assistants need training in how to recognize, assist, and encourage students who are technophobic or technically underprepared. A greater commitment should be made to recruiting a more diverse group of lab assistants. New students should also be introduced to the lab assistants early on, so that they can identify persons from whom they can seek assistance when they need it. An interpersonal relationship with the lab assistants makes it much easier for students to ask for help.

Colleges might do well to establish "electronic mentoring" networks of faculty, experienced students, and graduate students, who could respond to

fundamental and frequently asked technology questions via computer networks, encouraging students to actually use the technology in a non-threatening way to obtain needed information. The mentors might also assist students with writing assignments, laboratory projects, and research questions involving the use of a computer, until they feel comfortable with doing it themselves or working with other students.

Cultural Bias toward Computers

Most college programs in technology do little to address cultural biases that some groups express toward information technology. The fact that very few African Americans and Hispanics are enrolled in computer technology programs in higher education is evidence of some kind of cultural attitude toward the technology. Stickles' research indicates that there is a strongly held negative prejudice among the black community toward computer technology.

Institutions will have to assist these students in overcoming their cultural resistance to the use of technology. Ignoring it only reinforces the idea that the technology is intended for particular types of people with presumably privileged backgrounds and experiences.

Targeted Training for Technically Underprepared Students

A major question facing all institutions of higher education is what to do about reducing the disparity of technology skills between low-income, technically underprepared students and the rest of the student population. Curricular model programs like the one offered at Hunter College, intended to remedy the technological skill differences among students, are still uncommon.

Metropolitan State College of Denver is attempting to address these technology differences by implementing a course on the introductory level that enhances students' skills while confronting their cultural biases toward the technology. Progress in this regard is particularly important to the college, due to the composition of the student body and the urban location of the campus. Students of color and women comprise over fifty percent of the student population of 17,000 students. Nearly two-thirds can be classified as non-traditional students, and a large proportion of these are technophobic. In a recent study conducted by the College's Computer Management Science

Department, approximately one third of the student population was perceived as technologically unskilled by faculty and department chairs. Another third exhibited minimal information processing knowledge. Until now, there have been no courses to assist students with the increasing technology demands of the faculty and the institution.

The College operates four computer labs that are available to all enrolled students. Many of the African-American students do not use the computer labs. Hispanic women use the labs but Hispanic males are rarely seen there.

In an effort to address these issues, problems, and needs, three faculty members recently designed an introductory level course entitled: "Should I or Shouldn't I: Ethical Issues in Information and Communication Technology." The course is designed to tackle the cultural bias of many students of color toward the technology by raising questions about the consequences of both using and not using the technology in today's global environment. Students will be given two weeks of intense training on the computer in specific computer labs to acquaint them with the labs, lab technicians, computers, and specific computer programs. This training focuses on word processing skills, Windows, and Internet applications.

Students will work in collaborative teams throughout the course. They will visit major information laboratories in the Denver region such as the AT&T Lab, the U.S. West Labs, and the National Cable Labs so that they can see the applications of the technology, network with experts in the profession, and connect with possible career mentors.

Taught from an interdisciplinary framework (philosophy/ethics, social sciences/communication and technology), students are asked to understand the role of information and technology in the rapidly changing 21st century environment. A pilot offering of the course will be conducted during the spring 1996 semester with a pre-test and post-test evaluation of both the cognitive information learned by the students and their attitudes toward the course design, the technology, and the instructional pedagogy.

Resistance and Forward Motion

Instituting this new course has demonstrated once again how difficult it is for the faculty and administration in an institution to relinquish territorial control and work in a collaborative manner. Disciplinary imperatives, concern for FTE's, and perceived limited resources have all dictated how soon this course will be implemented into the curriculum offerings of the college.

At the provost's and dean's levels the course "Should I or Shouldn't I?" has gained recognition as a possible strategy for retaining and training minority and low income students. Some senior academic administrators have consistently supported the lead faculty member in her efforts to design the course, and have also provided advice and support in the selection of other faculty needed to teach the interdisciplinary course. Others have been either lukewarm in their support or even unsupportive and discouraging.

Several roadblocks have delayed the development of the course. They include denying faculty release time from their current teaching assignments or denying a need for such a course because "technophobia is certainly overblown among minorities." The general scarcity of resources has also led to disagreements over the FTE's earned from students' participation in the course and the proposed assignment of particular faculty to teach the course. Since the course should be team taught, faculty resources are a concern to chairs, deans, and the college.

Faculty themselves appear reluctant to get involved with such a course. It can be a threatening prospect to "team teach" a course. For some faculty the course requires creative instructional development since minorities and women learn differently than white men. In addition, the cultural biases against technology exhibited by some ethnic groups must be overcome before learning can take place. Assisting such students to conquer their learned prejudices and fear of technology requires faculty energy, creativity, risk-taking, and flexibility in applying various pedagogies in the classroom. Many faculty members are reluctant to expend such energy in the pursuit of educating these groups of students. Seven faculty were contacted and asked to participate. Only two agreed to do so.

To get the program started, the course was attached to the freshman program course offered to entry level freshmen at the college. The first semester of this program consists of an interdisciplinary course in which ethics, society values, conflict management, and pluralism are explored through group discussions. The new course "Should I or Shouldn't I?" was proposed as a second semester offering in the Freshman Program, to provide a ready made group of students and to save considerable time and energy on advertising the course.

The class is to start during the 1996 summer session. Many freshman students enroll in the summer bridge program, which includes the Freshman Program course. The timing of the course will guarantee sufficient numbers

in the course to justify the use of resources and allow the faculty to pre and post test the results of the course on the minorities and low income students who enroll.

Conclusion

It is increasingly clear that colleges and universities need to guard against promoting economic classism, by acknowledging and working to decrease the disparities between the computer competencies of students from low socio-economic backgrounds and those from the middle and upper strata. There are a variety of ways that colleges and universities can manage this problem.

Greater accessibility to computers in a friendly, supportive, and diverse computing environment should be a primary goal. Computer labs should be characterized by a more diverse staff, trained in assisting students, not just servicing machines. Pedagogies should be designed that link the learning styles and requirements of minority and women studentsto the technology content being taught. Course content should address the cultural prejudices of some minorities toward the technology.

Colleges and universities must assume greater responsibility for providing appropriate technological accessibility and education for all students. With deliberate attention to these issues, our institutions of higher learning will be able to claim that they are doing everything possible in this area and to keep the doors of education open to all deserving students. In Resta's words, with our help they will "increase their computer competence, take greater advantage of the information resources within the college/university, enhance their own academic productivity and participate fully in our increasingly technological world."

Suggested Readings

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