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**Computers in Teaching Social Science in American
Universities: A Survey, Critique, and Example**

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Sometimes I wonder why any college professors work at improving their teaching. The reward structure at most universities values professional publications more than classroom performance, so why spend time cultivating an underappreciated skill? The answer must be that those professors are educators as well as scholars. They are genuinely interested in what and how much their students learn, and they try - not always with success - to improve both their techniques of instruction and their students' methods of learning. At least, that is the message I draw from this international gathering of European professors to discuss computer usage in teaching political science. My role in this gathering is to deliver a letter from America that reports on computer usage in teaching social science at the college level in the United States. Afterwards I will present an example of my own use of computers in teaching the basic course in American government and politics to first-year undergraduate students. Along the way, I will comment on the micromania that is sweeping academia, offering my views of its negative, rather than positive, effects on computing in education.

It is clearly impossible to present a comprehensive account of computer usage in teaching social science across the United States. Even with loads of funding, any large-scale survey of instructors in different disciplines would take perhaps two years to design, execute, analyze, and write. By that time it would already be out of date. However, thanks to the timely publication of a special issue on the State of the Art of Social Science Computing in the last issue of *Social Science Microcomputer Review*, I can report and describe "what's going on" in the United States with some degree of confidence.

That symposium contained seven articles by specialists in every major discipline in the social sciences - sociology, anthropology, psychology, economics, public administration, history and political science. (Two additional articles focused on statistical applications and expert systems.) Synthesizing the observations in the seven review articles should provide a fairly accurate estimate of the role of computers in social science teaching:

Synthesizing the Assessments

- I. Social scientists engaged in computing today are preoccupied with microcomputers.
 - A. There is relatively little mention of activities using central computing facilities.
 - B. The microcomputer of choice (or perhaps of necessity) is the IBM-compatible type.

1. There are a few references to Apple II computers,
2. a very few references to Macintosh computers,
3. and virtually no references to other makes.

II. Most discussion of microcomputer in the social sciences focus on their use in research rather than teaching.

- A. Everyone mention word processing as the most widely used computer application.
- B. The next most popular research application across the social sciences is statistical analysis.
- C. Concerning other research applications of computers, social scientists are most enthusiastic about exchanging messages through some form of electronic mail.

III. Social scientists display some uncertainty in discussing the applications of microcomputers in teaching.

- A. They note the great commitment needed to develop computer applications in teaching yet a general lack of university support for such efforts.
- B. The most established and secure computer application to teaching is in statistical analysis.
- C. Concerning other teaching applications of computers, social scientists are most enthusiastic about simulations.
- D. American social scientists note with ambivalence the important influence of textbook publishers on software for teaching.
 1. Some tutorial-type programs or "study guide" programs are judged to be valuable (or at least harmless) for students who need additional help.
 2. Course-related software tends to be developed for introductory courses, where the market is larger, than for middle level or advanced courses.
- E. These articles are as notable for what they do *not* emphasize about computers in teaching.
 1. They neglect the role of computers in teaching students to analyze textual materials, which are so important in the social sciences.
 2. They write mainly about how students might use computers outside the classroom, not how *teachers* might use computers in the classroom as aids to lecturing or class discussion.
 3. They write mainly about how faculty can use computers to access rich varieties of data - not about how programs can be written that allow *students* to access rich varieties of data.

4. They write mainly about how faculty can use electronic mail to exchange mail with other faculty - not about how faculty can use electronic mail to communicate with *students*.

5. In general, these articles have very little to say about educational benefits from computer networking in the form of accessing common data files, submitting papers via computers, sharing common programs, and otherwise facilitating the interaction between students and teachers.

People are quick to explain new patterns of social behaviour in terms of technological change, I will join the crowd. My explanation for the emphasis on individualism in computer teaching within the social sciences and for the neglect of community lies in the microcomputer revolution itself.

Micromania in Academia

As the title suggests, this section criticizes the head-long rush into microcomputers as the approach to computing in higher education. It does not criticize computing per se, only academics' consuming love of microcomputers that blinds them to seeing the place of centralized equipment and support in educating the current crop of students. Because I defend centralized computing, some readers may regard me as a hopeless Neanderthal who hasn't experienced the wonders of microcomputers. But, I am a long-standing, paid-up member of the club.

The thesis underlying my critique is reflected in this analogy:

personal computer : private automobile :: centralised computing : mass transportation

The personal computer is to centralized computing, as the private automobile is to mass transportation. While the private automobile has many good points, its widespread usage has also presented problems and costs to society - especially the deterioration of mass transportation. I will examine this phenomenon after establishing the first premise, the similarity of personal computers to private automobiles. Ostensibly, private automobiles offer people freedom of movement in place of slow, unreliable, inflexible public transportation. But automobiles offer much more: social status that comes from pride of ownership and the sense of being thoroughly modern. Microcomputers are much the same. Like cars, they're shiny, they smell good, and they come in newer, faster and more luxurious models. Like cars, they help satisfy the acquisitive instinct.

We know what happens to new cars; they depreciate rapidly. In this respect, microcomputers outdo new cars; microcomputers depreciate *very* rapidly. Old cars quickly become junk; even young microcomputers become obsolete. There are several implications of the analogy between personal computers and private automobiles for educational computing. One is the administrations which buy computing hardware for their faculty are fulfilling a variety of faculty needs, not all of which are academic. The second is that those administrations will encounter additional requests from the same faculty, as the original purchases become obsolete. Like the tar baby, it is easier to put your hand in than to pull it out.

As a faculty member, I do not regard spending money on the faculty as necessarily bad, but I am worried about where that money is coming from. At my university, at least, money spent on microcomputers is regarded as money spent on academic computing. To a large extent, money spent to support microcomputing is diverted from funds that previously supported centralized computing. Which brings me to the conclusion of the analogy: the similarity between centralized computing and mass transportation.

The private automobile gave rise to many blights on our society. You have your own long list, but we can all agree on these evils: traffic jams, shopping strips, drive-in funeral parlors, the decay of central cities - and the deterioration of mass transportation, at least in the United States. Mass transportation, like a helping parent, is most appreciated when it's no longer around. No one planned its demise but it resulted when the haves bought their private cars and felt they didn't need to support mass transportation for the have-nots. Deprived of revenue, the system began to deteriorate, and its usage declined to the detriment of all.

Every analogy can be carried too far, and the similarity between mass transportation and centralized computing is not as striking as that between the personal computer and the private automobile. Nevertheless, there are strong parallels. Similar to a mass transportation system, a centralized computing facilities offers large numbers of people access via remote terminals at many points on campus. In an educational setting, this means that computing can be used for large classes that might overwhelm any microcomputer cluster. Although some day local area networks and optical disc storage may materially change the game, for the *current crop of students* centralized facilities allow much more practical ways of using specialized course programs, sharing common data sets, and exchanging mail messages.

As a mass transportation system moves large numbers of people, a mainframe computer moves large amounts of data and performs many calculations quickly. In an educational setting, this means that centralized sites are well-suited to receiving, storing, and disseminating data from large studies such as national sample surveys, financial statistics, and census reports. While individual faculty members with hard disks and their private Ferraris may be able to serve their narrow research purposes, the absence of centralized computing makes it much harder for the have-not students (and most of the current crop are computer have-nots) to do comparable analyses for their much broader set of needs.

In the past, students who needed to perform secondary analysis on existing data for personal research or class projects would seek assistance in accessing data at "the computing center" - or an equivalent service center on campus. Such staff probably still exists at most universities, but an overworked staff of approximately the same size is likely to be busy answering hundreds of microcomputer questions, most of which deal with word processing in one way or another.

If Northwestern's experience is any guide, most of the surge in microcomputing - by faculty, administrators and students alike - can be attributed to more and better word processing. A 1987 survey of computer usage among faculty and staff showed that most respondents by far (78%) reported "heavy" use of either IBM-compatible or Macintosh microcomputers compared with only 41% who were heavy users of all other mini and mainframe computers on campus. Of all these "heavy" computer users, more than

three-quarters (76%) were heavy users of word processing. No other application - graphics, programming statistical packages, and so on - was used by more than 23% of these users.

If anything, students are even more likely to equate computer usage with word processing. My annual survey of about 100 students in my statistics course has found few students who has used computers for anything other than word processing. The students who flock to our microcomputer clusters at the end of any quarter tend to be doing word processing, and little else.

Just as American's love affair with the personal automobile has contributed to the deterioration of mass transportation, I fear that micromania in academia will snuff out the fragile organizational system that supports central computing facilities. Let's make sure that adequate expressways are built, that gasoline is cheap, and that everyone has a car before abandoning mass transportation.

A Community Approach to Teaching with Computers

Use of microcomputers tends to encourage "individualism" in instruction. Because I prefer to regard my classroom as a "community" of students, I describe my approach to teaching with computers as a community approach rather than an individualistic approach. I have been sufficiently critical of the single-minded reliance on microcomputers in teaching; it is time to provide an alternative example. Although I could illustrate my approach with reference to my lecture course on elementary statistics, taught annually to about 100 upper-division undergraduates and beginning graduate students, statistics is an "easy" course in which to implement computers. Instead, I will describe the teaching techniques I used in the Winter of 1987 to teach the beginning course in American government and politics to 170 lower class undergraduates.

In this course I tried to develop a teaching environment that uses computers - a mainframe *and* a microcomputer - to engage students in the course, mainly in the classroom itself. The micro-computer is used to create and then to project my lecture in topical outline form on a large screen behind me as I speak. I also incorporate graphics of voting behaviour, government spending, and political structures into my lecture outline for display on the screen. In addition I use a microcomputer for creating the full-sentence outlines that actually guide my lectures. On the same day after I have delivered the lecture, I transmit the full-sentence version of my lecture outline to our mainframe computer. Interested students are invited to access my "bulletin board" of course lectures and to print out their own copy of my full-sentence outline.

In addition, students are invited to use the electronic mail capabilities of the mainframe to communicate with me daily on any matter of substance or procedure related to the course. For my part, I try to read my mail daily and to answer their questions on the spot with the "reply" capability in electronic mail. Quite commonly, students raise questions that I take up the next day in class for correction, clarification or elaboration. This is what makes electronic mail a "community" rather than an "individualistic" approach to teaching.

Lest one think that I see no value in the individualistic approach, I refer to my CROSSTABS program, coauthored with Philip A. Schrodt. CROSSTABS, which runs on the Macintosh, Apple II and IBM-compatible computers, is software designed specifically for the American government course. It contains two datasets - 55 variables on American voters in 1984 and 45 variables on Members of Congress in 1986 - and allows students to cross-tabulate any of these variables to answer their own research questions or questions contained in an accompanying student workbook. Both the computer program and the student workbook are published in conjunction with a basic textbook on American government, *The Challenge of Democracy*.

My major point in closing is that instructors might think of ways to use computers to *enhance* as well as to supplement their traditional methods of teaching. Instructors need not look for specialized games and simulations to use computers in teaching subject matter courses. By bringing computers into the classroom to assist their lecturing and students note-taking, teachers may be able to enhance their teaching performance. All it takes is some computing resources, some imagination, and a great deal of time. Your reward will be your excitement in becoming newly engaged in the educational process. It is unlikely that you will be paid any more.
