



**AgEcon** SEARCH  
RESEARCH IN AGRICULTURAL & APPLIED ECONOMICS

*The World's Largest Open Access Agricultural & Applied Economics Digital Library*

**This document is discoverable and free to researchers across the globe due to the work of AgEcon Search.**

**Help ensure our sustainability.**

Give to AgEcon Search

AgEcon Search

<http://ageconsearch.umn.edu>

[aesearch@umn.edu](mailto:aesearch@umn.edu)

*Papers downloaded from **AgEcon Search** may be used for non-commercial purposes and personal study only. No other use, including posting to another Internet site, is permitted without permission from the copyright owner (not AgEcon Search), or as allowed under the provisions of Fair Use, U.S. Copyright Act, Title 17 U.S.C.*

Elizabeth J. Greenberg

# More Metro than Nonmetro Students Have Access to Computers, But Their Rates of Usage are Similar

Computers are available to students in most U.S. high schools, but they are most likely to be available in schools in or near urban areas. Both metro and nonmetro schools outside the South are more likely to have computers available to students than are Southern schools. Although computer availability varies by how urban a county is and the region in which the county is located, actual student use of computers does not vary as much by location. Many students appear not to be using the computers available in their schools.

## More Metro Than Nonmetro 12th Graders Have Computers Available for Their Use in School

According to data from the 1992 National Assessment of Educational Progress, 91 percent of metro students have computers available to them in math classes compared with 78 percent of nonmetro students. (See "Data and Definitions," p. 64, for a discussion of how these data were coded and analyzed.) This difference in the availability of computers to students is not simply a function of the tendency for metro schools to be larger than nonmetro schools. In fact, when school size is taken into account, the differences between metro and nonmetro schools become even larger. In schools with 400 to 800 students, 96 percent of metro students have computers available in math classes, compared with 77.5 percent of nonmetro students (fig. 1).

Ruralness as a factor in determining how likely students are to have computers available in their classrooms is further supported by matching the student data with the ERS urban-rural continuum code for the county in which the student attends school. There is a clear pattern that the more rural a county is, the less likely it is to have computers available in math classes (fig. 2). For example, in

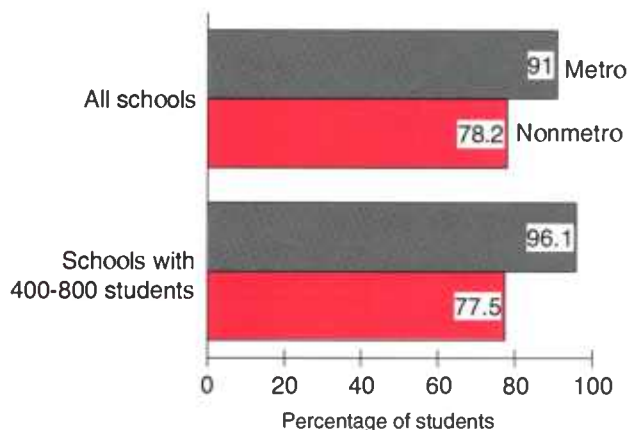
the core counties of the largest metro areas, 92 percent of students have computers available in math classes. In totally rural counties not adjacent to a metro area, 70 percent of students have computers available in math classes.

In addition to ruralness, proximity to metro areas has some effect on the availability of computers for students. Students in totally rural counties adjacent to metro areas are somewhat more likely to have computers available than are students in rural counties not adjacent to metro areas. Likewise, students in the more urban nonmetro counties are more likely to have computers available if the counties are adjacent to metro counties (fig. 2).

Figure 1

### Share of 12th graders in schools with computers available for math class, 1992

*Metro schools are more likely to have computers available for students than nonmetro schools, even when larger schools are compared*



Source: Calculated by the author using data from the 1992 National Assessment of Educational Progress.

Elizabeth Greenberg is a social science analyst at Washington State University at Pullman.

The difference in availability of computers between urban and rural students applies in all regions of the United States (fig. 3). The gap between metro and nonmetro availability is largest in the South, where rates of computer availability are the lowest in the country. These regional differences support the findings reported in other articles in this issue, which show that the South, particularly the rural South, is still at a disadvantage educationally when compared with the rest of the United States. The lower availability of computers for Southern students should concern policymakers because it may make it more difficult for Southern students' achievement scores to catch up with those of the rest of the country.

### Metro and Nonmetro Students' Frequency of Computer Use Is Quite Similar

When 12th graders were asked how often they used computers, the answers of metro and nonmetro students were remarkably similar. In fact, rates of computer use were slightly higher for nonmetro students, although the difference was not statistically significant. Eight percent of metro students reported using computers almost every day compared with 10 percent of nonmetro students. At the other end of the spectrum, 71 percent of metro stu-

dents reported never or hardly ever using computers compared with 69 percent of nonmetro students (fig. 4).

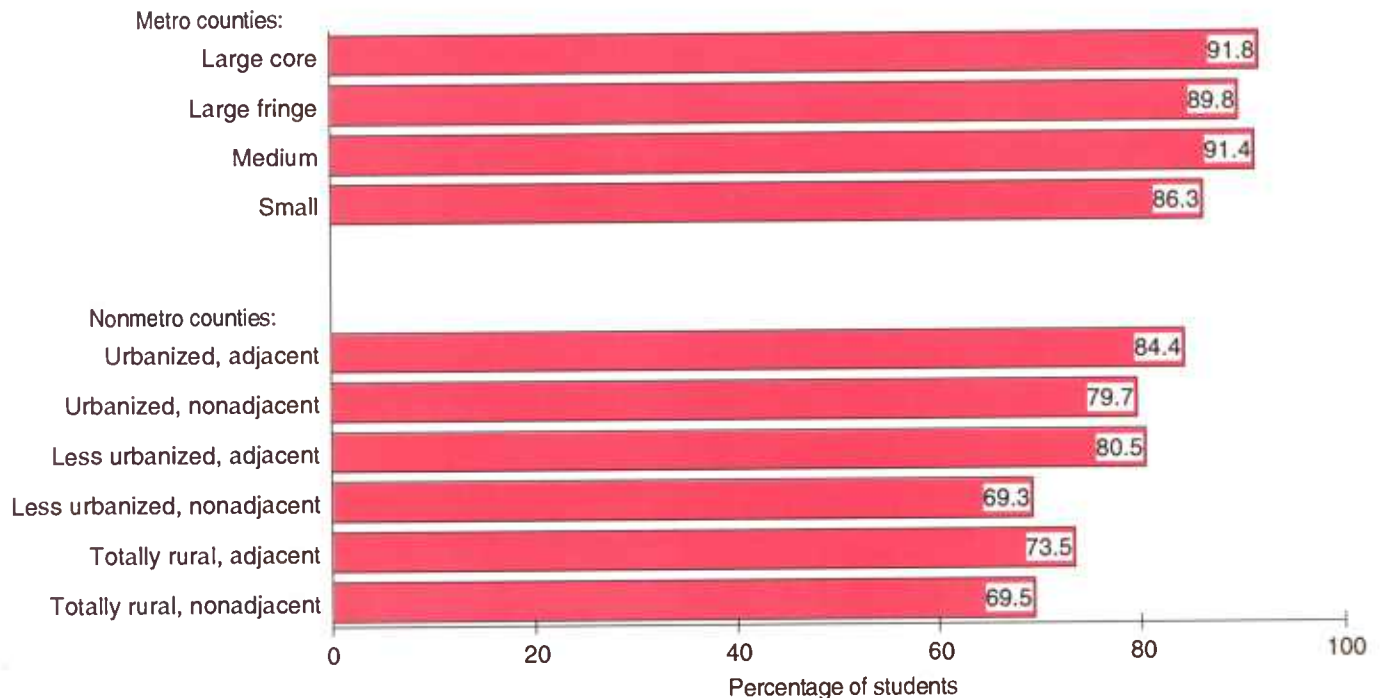
These rates vary somewhat regionally. As would be expected from the data on computer availability, Southern nonmetro students are most likely to report that they never or hardly ever use a computer. Among nonmetro students, 73 percent of those in the South fall into the lowest category of computer use compared with 63 percent of those in the North and 69 percent of those in the West. Because the nonmetro sample of students asked about computer use was quite small (see "Data and Definitions"), I was not able to test for differences in computer use among students living in the 9 ERS rural-urban continuum county groups.

The October 1993 Current Population Survey (CPS) shows substantially higher rates of computer use by high school students than the 1992 National Assessment of Educational Progress (NAEP) does (fig. 5). Some of this difference may be caused by the CPS data being almost 2 years newer than the NAEP data. Computer use has undoubtedly increased somewhat during each year of the 1990's. Much of the difference between the two data sets is probably because the CPS data primarily represent par-

Figure 2

### Share of 12th graders in schools with computers available for math class by rural-urban continuum, 1992

*The more rural the county in which a 12th grader lives, the less likely he or she is to have a computer available in math class*

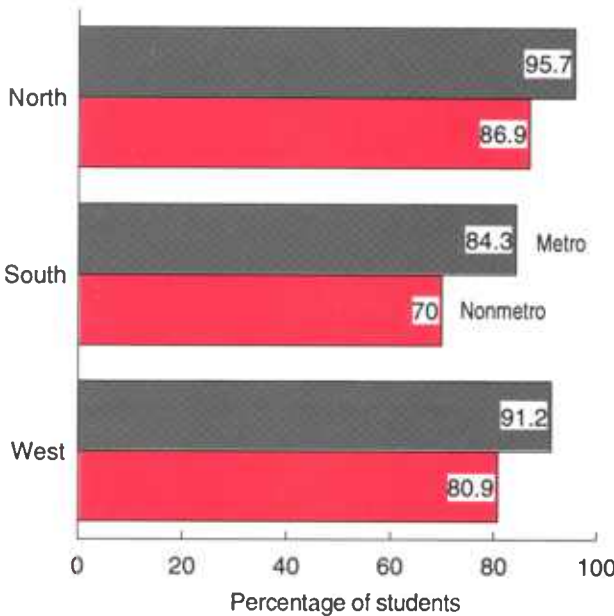


Source: Calculated by the author using data from the 1992 National Assessment of Educational Progress.

Figure 3

**Share of 12th graders in schools with computers available for math class by region, 1992**

*Metro students are more likely to have computers available for math class than nonmetro students in all regions; the South, both metro and nonmetro, lags the rest of the country in the availability of computers*



Source: Calculated by the author using data from the 1992 National Assessment of Educational Progress.

ents' reporting on their children's activities (see Data and Definitions, p. 64). Although the CPS shows higher rates of computer use than the NAEP does, it also shows relatively small differences between metro and nonmetro areas. According to the CPS, 47 percent of metro students never use a computer, compared with 41 percent of nonmetro students. Like the NAEP, the CPS shows the lowest rates of computer use among southern nonmetro students. According to the CPS, 48 percent of southern nonmetro students never use a computer, compared with 36 percent of northern and 32 percent of western nonmetro students.

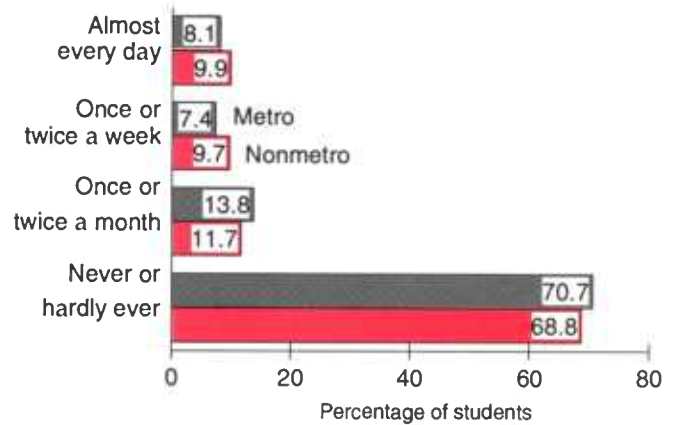
**Conclusions**

One reason that computers appear to be available to more students than would be expected from the students' responses to the question of how often they use computers is that the NAEP data set does not contain a measure of how many computers are available in each classroom. If only one or two computers are available per class, I would not expect all students to be able to use them daily or even weekly. In addition, having only a few computers available makes it quite difficult for a teacher to plan a lesson that requires the use of computers.

Figure 4

**Frequency of computer use by 12th graders, 1992**

*Rates of computer use are almost identical for metro and nonmetro 12th graders as reported by the students themselves*

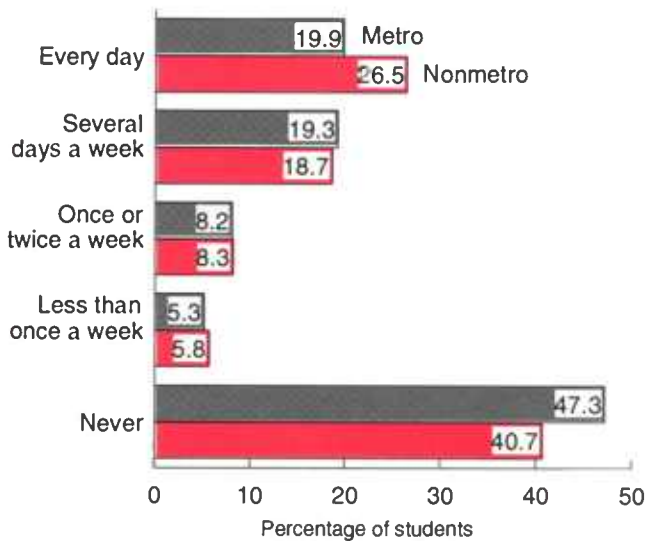


Source: Calculated by the author using data from the 1992 National Assessment of Educational Progress.

Figure 5

**Frequency of computer use by all high school students, 1993**

*Rates of computer use for metro and nonmetro students are higher when reported by their parents or other adults*



Source: Calculated by the author using data from the October 1993 Current Population Survey.

The data also do not indicate the model and type of computers available in classrooms. Many school computers are older models for which software may be difficult to obtain, limiting their usefulness in the classroom.

Other researchers have also found that computers are available more frequently than they are used. In a 1995 study, the Office of Technology Assessment points to deficiencies in teacher training as a primary reason that computers are not used more extensively in classrooms. One of their recommendations is that "helping teachers to use technology effectively may be the most important step to assuring that current and future investments in technology are realized" (Office of Technology Assessment, p. 2). The gap between computer availability and computer use suggests that this finding is true in rural areas as well as nationally.

However, in rural areas, particularly in the South, computers are still not widely available in schools. Helping schools purchase computers, as well as training teachers in computer use, may be necessary if rural students are to have the same educational opportunities as urban students.

#### **For Further Reading . . .**

U.S. Congress, Office of Technology Assessment, *Teachers and Technology: Making the Connection*, OTA-EHR-616, April 1995.

### **Data and Definitions**

Most of the data analyzed in this article come from the 1992 National Assessment of Educational Progress (NAEP). Data for the 1992 NAEP were collected between October 1991 and May 1992. In addition to testing the cognitive achievement levels of students, the NAEP asked both students and their schools' principals (or the principals' designated representatives) a series of background questions, including questions on computer availability and use in the school. I used data from the school questionnaire, as well as data from the questionnaires administered to 12th graders who took the mathematics achievement test. Questions about the availability of computers in the school were asked of all principals. Questions about computer use were asked only of students taking the mathematics achievement test.

Because I am primarily interested in the question of what opportunities are available for students, I attached data from the school questionnaires to all student records from each school. The analysis reported in this article is then in terms of what percentage of students have the opportunity to use computers, rather than what percentage of schools have computers available. Student questionnaires numbered 18,328, of which 3,609 were from students attending school in nonmetro areas. The cases are weighted to represent the 12th grade population of the United States.

School principals were asked several questions about the availability of computers in their schools. For this analysis, I combined three of those questions: (1) "Are computers always available in math classrooms?" (2) "Are computers available to bring to math classes?" and (3) "Are computers grouped in a lab for math classes?" If the principal answered yes to one or more of the three questions, I coded the school as having computers available for math class and the students in the school as having the opportunity to use computers in math class. Principals were also asked comparable questions about the availability of computers in English classes. Their answers showed the same geographic patterns as for computer availability in math classes, so I did not report the English class results in this article.

The Census Bureau's Current Population Survey (CPS) also asked questions about computer use in schools in a special supplement conducted in October 1993. The CPS is a household survey in which one respondent answers questions about all members of the household. The question I analyzed, "How often does \_\_\_\_ use computers in school?" was asked about each household member currently enrolled in school. It was generally answered not by the student, but by their parent or another adult in the household. A very small percentage of students aged 15 or older responded to the questionnaire themselves and thus answered the question about themselves. Because parents, particularly parents of high school students, are less familiar than students and principals with what actually goes on in school, I consider the CPS data to be less reliable than the NAEP data when analyzing school practices.

To analyze regional differences, I collapsed the data from the Northeast and Midwest census regions into one category called "North," because the nonmetro Northeastern sample is quite small in both data sets and is, therefore, subject to high sampling error.