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A Profile of Participation in Distance Education: 1999–2000

Postsecondary Education Descriptive Analysis Reports

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Postsecondary Education Descriptive Analysis Reports

November 2002

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Executive Summary

During the 1990s, distance education availability, course offerings, and enrollments increased rapidly. The percentage of 2- and 4-year degree-granting institutions offering distance education courses rose from 33 to 44 percent between 1995 and 1997, and the number of such courses nearly doubled. In 1997, one-fifth of the nation's 2- and 4-year degree-granting institutions also planned to start offering distance education courses in the next 3 years (Lewis et al. 1999). While previous reports have studied institutional (Lewis et al. 1999) and faculty (Bradburn 2002) participation in distance education, this report focuses on student participation. This report examines the participation of undergraduate and graduate students in distance education.

Students responding to the 1999–2000 National Postsecondary Student Aid Study (NPSAS:2000) were asked, "During the 1999–2000 school year, did you take any courses for credit that were distance education courses? By distance education, I mean courses delivered off campus using live, interactive TV or audio; prerecorded TV or audio; CD-ROM; or a computer-based system such as the Internet, e-mail, or chat rooms." Students who reported taking distance education courses were asked about their experiences with distance education.

This report uses data from NPSAS:2000 to address several research questions:

- Which students participated in distance education in 1999–2000? Were any student characteristics related to participation in distance education?
- Which types of technology did students use to take their distance education courses?
- How satisfied were students with their distance education courses?

Students' overall participation, as well as their participation by type of distance education technology, is examined in terms of numerous student characteristics, including demographics (such as gender, race/ethnicity, and age); indicators of socioeconomic status (such as parents' highest level of education and students' family income); family status (marital status and whether students had dependent children); institution and academic characteristics (such as institution type, and students' class level, degree program, and field of study); and employment characteristics. This report also includes a multivariate analysis that shows how various student characteristics were related to participation in distance education after controlling for the covariation of related variables.

Student Participation in Distance Education

The findings of this study suggest that even though distance education participation rates were relatively low in 1999–2000 (8 percent of undergraduates and 10 percent of graduate and first-professional students reported taking distance education courses), clear patterns of participation emerged for both undergraduates and graduate/first professional students. Students who reported participating tended to be those with family responsibilities and limited time. They

were more likely to be enrolled in school part time and to be working full time while enrolled.

Participation of Undergraduates

Among undergraduates, characteristics associated with family and work responsibilities (such as being independent, older, married, or having dependents) were associated with higher rates of participation in distance education. Gender was related to participation as well: females were more likely than males to participate (figure A). The participation rates of undergraduates attending public 2-year institutions and those seeking associate's degrees also tended to be higher than those of their counterparts in other types of institutions and degree programs. In addition, participation in distance education varied by undergraduate field of study. Undergraduates majoring in education participated in distance education at a higher rate than did those majoring in most other fields of study.

Students who reported participating in distance education were asked if their entire program was taught through distance education. Among undergraduates who participated in distance education, those who had characteristics associated with higher overall rates of participation were also generally more likely than those who lacked these characteristics to report that their entire program was taught through distance education.

Figure A.—Percentage of 1999–2000 undergraduate and graduate/first-professional students who participated in distance education, by gender

NOTE: Includes students who participated either only at the institution where they were primarily enrolled or both at the institution where they were primarily enrolled and somewhere else. Students who participated in distance education only at an institution other than the one where they were primarily enrolled were excluded.

SOURCE: U.S. Department of Education, National Center for Education Statistics, 1999–2000 National Postsecondary Student Aid Study (NPSAS:2000).

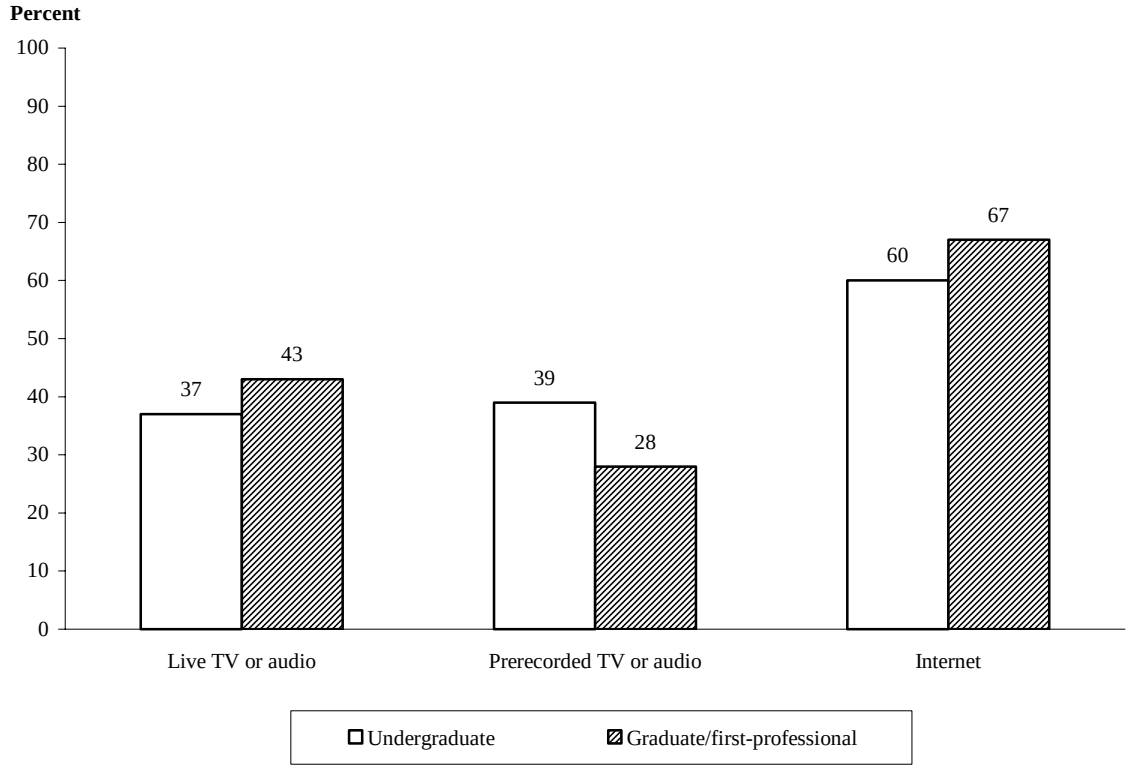
Participation of Graduate and First-Professional Students

Similar patterns of participation emerged among graduate and first-professional students. While a gender difference was not detected, married students and those with dependent children were more likely than their counterparts to participate in distance education. Greater work intensity also appeared to contribute to higher participation. Due to low incidence and resulting small sample sizes, it was not possible to conduct subgroup comparisons of the availability of graduate and first-professional students' entire programs via distance education.

Distance Education Delivery

Among those who took distance education courses, both graduate and undergraduate students were more likely to do so via the Internet than via either live or prerecorded TV or audio (figure B). Graduate and first-professional students were less likely than undergraduates to participate in distance education courses via prerecorded TV or audio but were more likely than undergraduates to participate via live TV or audio or via the Internet.

Figure B.—Among 1999–2000 undergraduate and graduate/first-professional students who participated in distance education, percentage who participated via live TV or audio, prerecorded TV or audio, or the Internet



NOTE: Includes students who participated either only at the institution where they were primarily enrolled or both at the institution where they were primarily enrolled and somewhere else. Students who participated in distance education only at an institution other than the one where they were primarily enrolled were excluded.

SOURCE: U.S. Department of Education, National Center for Education Statistics, 1999–2000 National Postsecondary Student Aid Study (NPSAS:2000).

Satisfaction With Distance Education

Undergraduate and graduate/first-professional students who participated in distance education were asked, "Compared to other courses you've taken, are you more satisfied, equally satisfied, or less satisfied with the quality of instruction you've received in your distance education courses?" About one-half of both undergraduates (47 percent) and graduates (51 percent) reported being equally satisfied with their distance education courses and their regular classroom courses (figure C). However, a higher proportion of undergraduates reported being less satisfied with distance education courses (30 percent) than reported being more satisfied (23 percent). Among graduate and first professional students, 27 percent reported being less satisfied and 22 percent reported being more satisfied.

Figure C.—Among 1999–2000 undergraduate and graduate/first-professional students who participated in distance education, percentage distribution according to satisfaction with quality of instruction in distance education relative to classroom-based courses

NOTE: Includes students who participated either only at the institution where they were primarily enrolled or both at the institution where they were primarily enrolled and somewhere else. Students who participated in distance education only at an institution other than the one where they were primarily enrolled were excluded. Percentages may not add to 100 due to rounding.

SOURCE: U.S. Department of Education, National Center for Education Statistics, 1999–2000 National Postsecondary Student Aid Study (NPSAS:2000).

Foreword

This report profiles the extent to which undergraduate and graduate and first-professional students who were enrolled in U.S. postsecondary institutions in the 1999–2000 academic year participated in distance education. It is based on data from the 1999–2000 National Postsecondary Student Aid Study (NPSAS:2000), the fifth in a series of surveys conducted by the U.S. Department of Education. Each NPSAS survey is a comprehensive nationwide study to determine how students and their families pay for postsecondary education.

The report describes overall participation in distance education courses, the distance education technology used by students, and students' satisfaction with distance education courses. The report also includes a multivariate analysis that shows the residual relationship of various student characteristics to distance education participation.

The estimates presented in the report were produced using the NCES Data Analysis System (DAS), a microcomputer application that allows users to specify and generate tables for the NPSAS:2000 undergraduate and graduate surveys. The DAS produces the design-adjusted standard errors necessary for testing the statistical significance of differences in the estimates. For more information on the DAS, consult appendix B of this report.

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Introduction

The National Center for Education Statistics report *Distance Education at Postsecondary Institutions: 1997–98* states that about one-third of the nation's colleges and universities offered distance education courses during the 1997–98 academic year and another fifth planned to do so in the near future[1] (figure 1) (Lewis et al. 1999). To meet their distance education goals, institutions plan to commit considerable amounts of public and private resources to install, improve, and maintain their technological infrastructures (Oblinger, Barone, and Hawkins 2001). Given the potential costs and widespread distribution of distance education programs, it is important to know just how many students currently participate in distance education and who they are.

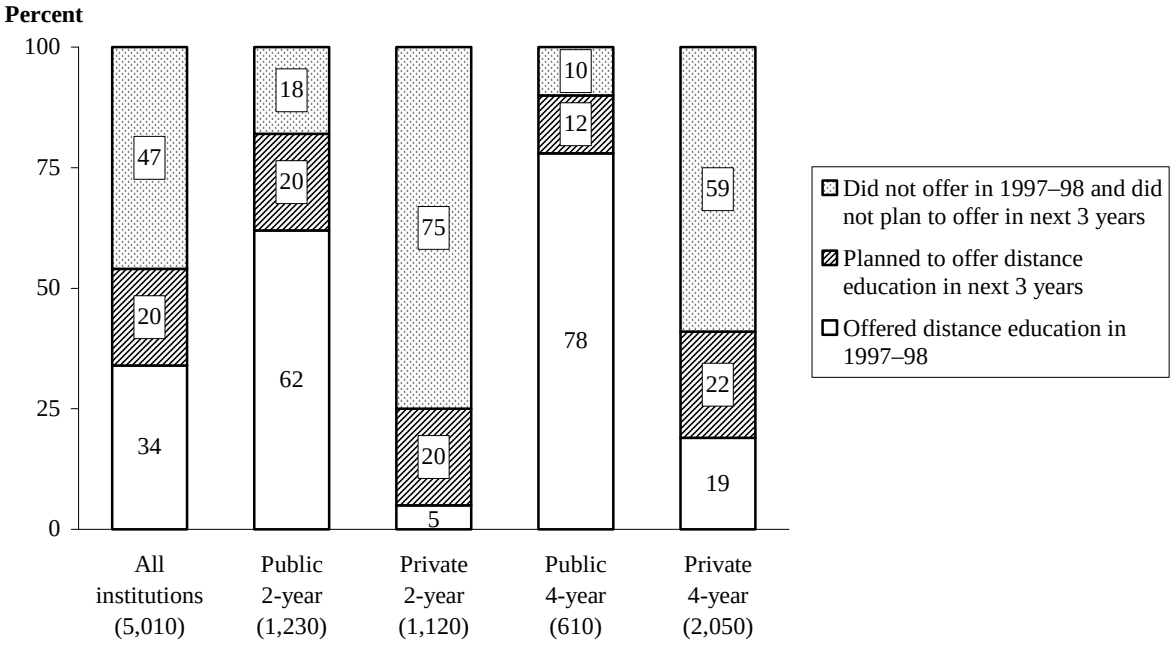
Although past reports have shown that institutional participation in distance education has grown rapidly (Lewis et al. 1999), in 1999–2000 the proportions of graduate and undergraduate students who reported participating in distance education through the institutions in which they were primarily enrolled were relatively small: 8 percent of all undergraduates and 10 percent of all graduate students reported doing so.[2] This study offers an overview of distance education participation with respect to student demographic and academic characteristics and institutional types. In addition, it explores how their distance education courses were delivered—whether via live or interactive TV or audio, the Internet, or prerecorded TV or audio—from a question that participants were asked in the 1999–2000 National Postsecondary Student Aid Study (NPSAS:2000).

While students did not report their reasons for taking distance education courses in NPSAS, the current study explores why certain students might participate. For example, students who are pressured for time, such as those who are parents or who work full time, might be more likely

[1]It is worth noting that while public 4-year institutions were more likely than public 2-year institutions to have offered distance education classes in 1997–98, a higher proportion of students at public 2-year institutions participated in distance education classes in 1999–2000.

[2]To enable comparisons according to institutional characteristics, the base for all NPSAS analyses in this report are students who participated in distance education at either the institution at which they were primarily enrolled or at both the institution at which they were primarily enrolled and somewhere else. Students who participated in distance education classes entirely at institutions other than the one at which they were primarily enrolled were excluded. Of all 1999–2000 undergraduates, 0.50 percent participated in distance education entirely at an institution other than the one at which they were primarily enrolled. Of all graduate and first-professional students, roughly 1 percent participated in distance education entirely at an institution other than the one at which they were primarily enrolled. Of students who attended more than one institution, 12 percent participated in distance education compared to 8 percent of students who attended one institution.

Figure 1.—Percentage distribution of 2-year and 4-year postsecondary education institutions that offered distance education courses in 1997–98, that planned to offer them in the next 3 years, and that did not plan to offer them in the next 3 years, by institution type: 1997–98

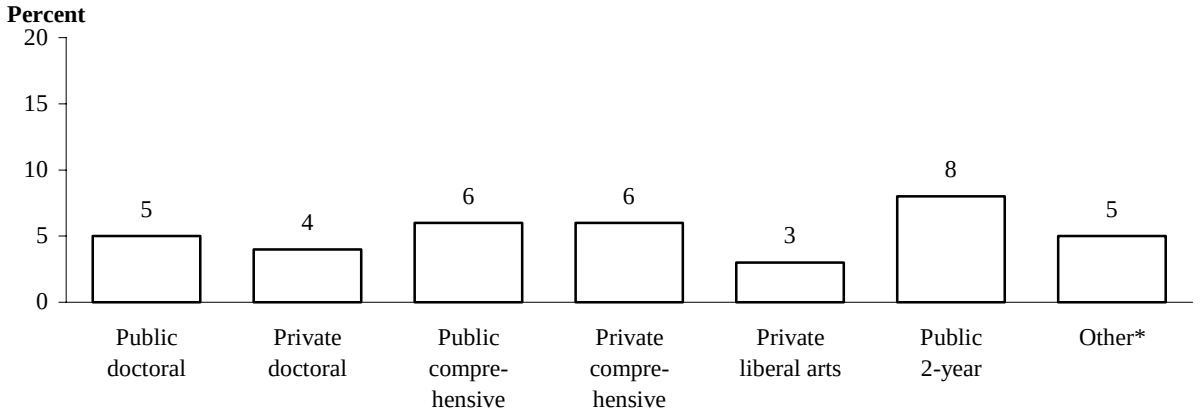


NOTE: Percentages are based on the estimated 5,010 2-year and 4-year postsecondary education institutions in the nation. Percentages may not add to 100 due to rounding.

SOURCE: Taken from table 2, Lewis, L., Snow, K., Farris, E., and Levin, D. (1999). *Distance Education at Postsecondary Education Institutions: 1997–1998* (NCES 2000–013). U.S. Department of Education, National Center for Education Statistics. Washington, DC: U.S. Government Printing Office.

than other students to participate more often (Gladieux and Swail 1999). Or perhaps students with disabilities who have trouble attending classes might participate at a higher rate than their peers without disabilities. Also, students who have trouble scheduling their classes due to family or employment obligations or have to commute long distances might find distance education more convenient. Finally, younger students, who are more familiar with Internet technology, might be more likely to participate than their older peers (Gladieux and Swail 1999). Studies have also shown that faculty at public 2-year institutions are more likely than faculty at private doctoral or liberal arts institutions to teach distance education courses (figure 2) (Bradburn 2002). Based on this finding, one might expect students at public 2-year institutions to participate more often than their counterparts at 4-year institutions. This analysis will explore these and other possible reasons why students participate in distance education.

Figure 2.—Percentage of instructional faculty and staff at degree-granting institutions who taught distance education classes, by institution type: Fall 1998



*Includes public liberal arts, private not-for-profit 2-year, and other specialized institutions.

NOTE: Includes all instructional faculty and staff at Title IV degree-granting institutions with at least some instructional duties for credit. Distance education classes refer to any identified as being taught through a distance education program. See the glossary in appendix A for details.

SOURCE: Taken from figure A, Bradburn, E.M. (2002). *Distance Education Instruction by Postsecondary Faculty at Degree-Granting Institutions* (NCES 2002–155). U.S. Department of Education, National Center for Education Statistics. Washington, DC: U.S. Government Printing Office.

Data

The most recent data available to analyze students' participation in distance education is NPSAS:2000, a cross-sectional survey that is representative of all undergraduate and graduate students enrolled in U.S. postsecondary institutions during the 1999–2000 academic year. The estimates and statistics reported in the tables and figures of this report are based on data from this survey, whose primary purpose is to provide detailed information on how students and their families pay for postsecondary education. The survey also contains comprehensive data on students' enrollment, attendance, and demographic characteristics.

The NPSAS:2000 data set contains several sources of data: institutional data, financial aid records, national loan files, and student interviews. The survey represents about 16.5 million undergraduates, 2.4 million graduate students, and 300,000 first-professional students who were enrolled at some time between July 1, 1999 and June 30, 2000. Variables presented throughout this report are defined in the glossary (appendix A).

NPSAS:2000 includes only institutions eligible for Title IV funding; therefore, since institutions offering a majority of instruction via correspondence or distance education are not currently eligible for Title IV funding, they are not represented in this study. Additionally,

NPSAS:2000 includes only students enrolled for credit at Title IV-eligible institutions. Thus, students enrolled only in non-credit courses (many of which could be distance education courses) are not included in this sample.

Organization of This Report

This report describes students' overall participation in distance education courses, the distance education technology that they used, and the extent to which they were satisfied with distance education courses. The report also includes a multivariate analysis that shows the residual relationship of various student characteristics to distance education participation.

Overall Participation in Distance Education

Differences Among Undergraduates

In 1999–2000, undergraduates who were surveyed in NPSAS were asked, "During the 1999–2000 school year, did you take any courses for credit that were distance education courses?" The survey interviewer then clarified the question by stating, "By distance education, I mean courses delivered off campus using live, interactive TV or audio, prerecorded TV or audio, CD-ROM, or a computer-based system such as the Internet, e-mail, or chat rooms."[3] This study examines students' responses by their demographic, family background, institution, and academic characteristics. Among undergraduates, there were many differences in the extent to which students participated in distance education, including differences by gender, age, and language spoken in the home. For example, females were more likely than males to take distance education courses (9 versus 7 percent) (table 1). Students whose primary language in the home was English were more likely to participate in distance education than students whose primary language was not English (8 versus 6 percent), although there were no differences among racial/ethnic groups. Additionally, undergraduates age 24 and over were more likely than students under 24 to participate (10 versus 6 percent).

The fact that older, working undergraduates participate in distance education at higher rates than their counterparts offers an initial indication that distance education might be especially attractive to students with family and work responsibilities. One might expect, then, that other characteristics such as marital status and parenthood would be related to greater levels of participation as well. As shown in table 2, married students were more likely than those who were unmarried to participate (11 versus 7 percent). In addition, those with dependent children (11 versus 7 percent) and those who were single parents (10 versus 7 percent) were more likely to take distance education classes. Also, independent students were more likely than dependent students to participate.[4] These patterns of participation show that distance education might be a more attractive option for older students with greater family responsibilities than for their peers.

Distance education rates varied by other family background characteristics as well. Among independent students, those who earned $50,000 or more were more likely to take distance

[3]Distance education does not include programs entirely offered through correspondence courses.

[4]Independent students are 24 or older who, according to financial aid eligibility criteria, are not financially dependent on their parents, are married, or have dependents.

Table 1.—Percentage of 1999–2000 undergraduate students who participated in distance education, and of those, the percentage whose entire program was taught through distance education, by student characteristics

	Total	Entire program taught through distance education
Total	7.6	29.0
Gender		
Male	6.5	26.2
Female	8.5	30.6
Race/ethnicity*		
White, non-Hispanic	8.0	27.9
Black, non-Hispanic	7.9	30.2
Hispanic	6.2	33.5
Asian	5.8	35.5
American Indian/Alaska Native	11.0	(#)
Pacific Islander/Native Hawaiian	8.5	(#)
Other	4.3	(#)
Primary language		
English	7.8	28.2
Other	6.3	36.1
Age		
Under 24	6.0	23.9
24 and over	9.9	33.1
Disability status		
Disability reported	8.8	31.1
No disability reported	7.5	28.7

#Too small to report.

*Following the Census 2000 model, NPSAS respondents were given the option of choosing more than one race. Those who chose more than one race were then asked: For historical purposes, could you please identify which single race best describes you? Priority was given to Hispanic/Latino regardless of race. Since so few students participate in distance education overall, the historical version of this variable (rather than the census version) was used to maximize the data by coding students who chose multiple races into the racial category they would pick if they could only choose one. See the RACE1 variable definition in the Glossary for further discussion.

NOTE: Includes students who participated either only at the institution where they were primarily enrolled or both at the institution where they were primarily enrolled and somewhere else. Students who participated in distance education only at an institution other than the one where they were primarily enrolled were excluded.

SOURCE: U.S. Department of Education, National Center for Education Statistics, 1999–2000 National Postsecondary Student Aid Study (NPSAS:2000).

education classes than those who earned less than $50,000 (11 versus 9 percent) (table 2). In contrast, no difference in participation rates was detected between dependent students whose parents earned $50,000 or more and those whose parents earned less than $50,000 (6 percent

Table 2.—Percentage of 1999–2000 undergraduate students who participated in distance education, and of those, the percentage whose entire program was taught through distance education, by students' family background characteristics

	Total	Entire program taught through distance education
Total	7.6	29.0
Dependency status		
Dependent	5.8	22.5
Independent	9.6	33.1
Parents' highest level of education		
Less than a bachelor's degree	8.3	31.2
Bachelor's degree or higher	6.7	25.8
Family income (dependent students)		
Less than $50,000	5.7	23.8
$50,000 or more	5.9	21.6
Personal income (independent students)		
Less than $50,000	9.1	31.3
$50,000 or more	11.0	37.5
Marital status		
Married	10.9	34.9
Not married	6.7	26.2
Dependent children		
One or more	10.9	33.0
None	6.5	26.7
Single parent status		
Single parent	9.8	33.3
Not a single parent	7.4	28.3

NOTE: Includes students who participated either only at the institution where they were primarily enrolled or both at the institution where they were primarily enrolled and somewhere else. Students who participated in distance education only at an institution other than the one where they were primarily enrolled were excluded.

SOURCE: U.S. Department of Education, National Center for Education Statistics, 1999–2000 National Postsecondary Student Aid Study (NPSAS:2000).

each). Additionally, undergraduates whose parents' highest level of education was less than a bachelor's degree were more likely to participate in distance education than students whose parents had earned a bachelor's degree or higher (8 versus 7 percent).

This study and prior institutional studies (Lewis et al. 1999) show that institutions offering associate's degrees are more likely than other types of institutions to offer distance education. Of

1999–2000 undergraduates, those who were enrolled at public 2-year institutions were more likely than students enrolled at any other type of institution (public 4-year, private not-for-profit 4-year, and private for-profit[5]) to take distance education classes (9 versus 7, 6, and 4 percent, respectively) (table 3). This finding is consistent with those of a study that found that faculty at 2-year public institutions were more likely than their counterparts at private doctoral or liberal arts institutions to teach distance education courses (Bradburn 2002). Correspondingly, students in associate's degree programs were also more likely to participate in distance education than students in certificate or bachelor's degree programs (10 versus 6 and 7 percent, respectively). Also, students who live 10 or more miles from the institution where they were enrolled were

Table 3.—Percentage of 1999–2000 undergraduate students who participated in distance education, and of those, the percentage whose entire program was taught through distance education, by institutional characteristics

	Total	Entire program taught through distance education
Total	7.6	29.0
Institution type		
Public 2-year	9.0	28.8
4-year total	6.6	27.8
Public	6.9	27.1
Private not-for-profit	6.1	29.8
Private for-profit	3.8	16.2
Degree program		
No degree	5.4	48.7
Certificate	6.2	37.3
Associate's	9.6	28.0
Bachelor's	6.6	26.4
Attend institution in state of legal residence		
Institution in state of legal residence	7.7	26.9
Institution not in state of legal residence	7.6	43.8
Distance from home		
Less than 10 miles	6.8	30.0
10 or more miles	8.2	28.1

NOTE: Includes students who participated either only at the institution where they were primarily enrolled or both at the institution where they were primarily enrolled and somewhere else. Students who participated in distance education only at an institution other than the one where they were primarily enrolled were excluded.

SOURCE: U.S. Department of Education, National Center for Education Statistics, 1999–2000 National Postsecondary Student Aid Study (NPSAS:2000).

[5]"Private for-profit" institutions include 4-year and less-than-4-year for-profit institutions.

more likely to participate in distance education than students who live closer to the institution (8 versus 7 percent), but no difference was detected in the participation rates of students who were enrolled in an institution in their state of legal residence and those who were enrolled out of state. These findings are consistent with the notion that nontraditional students tend to participate in distance education at greater rates than traditional students. Nontraditional students (those who are older, married, parents, and who have greater financial responsibilities) tend to enroll in 2-year institutions and seek associate's degrees at greater rates than do their more traditional peers.

Along with the demographic characteristics associated with nontraditional students, some academic characteristics appear to be related to distance education participation. Of 1999–2000 undergraduates, fourth- and fifth-year undergraduates were more likely to participate in distance education than other undergraduates (11 versus 7 and 8 percent, respectively) (table 4).

Table 4.—Percentage of 1999–2000 undergraduate students who participated in distance education, and of those, the percentage whose entire program was taught through distance education, by type and level of students' academic program

	Total	Entire program taught through distance education
Total	7.6	29.0
Class level		
1st through 3rd year	7.4	27.7
4th and 5th year (did not graduate)	10.8	32.9
Graduated 1999–2000	7.7	25.6
Field of study		
Humanities	6.8	30.7
Social/behavioral sciences	6.6	26.1
Life sciences	5.5	21.9
Physical sciences	3.3	(#)
Math	8.2	(#)
Computer/information sciences	8.9	24.7
Engineering	4.6	19.0
Education	11.1	28.0
Business/management	8.9	30.6
Health	8.6	30.6
Vocational/technical	8.3	28.7
Other technical/professional	7.2	27.8
Undeclared/no major	5.5	36.9

#Too small to report.

NOTE: Includes students who participated either only at the institution where they were primarily enrolled or both at the institution where they were primarily enrolled and somewhere else. Students who participated in distance education only at an institution other than the one where they were primarily enrolled were excluded.

SOURCE: U.S. Department of Education, National Center for Education Statistics, 1999–2000 National Postsecondary Student Aid Study (NPSAS:2000).

Additionally, education majors were more likely to take distance education classes (11 percent) than students in majors such as: undeclared students (6 percent) and students in the humanities and social sciences (7 percent each), life sciences and engineering (5 percent each), physical sciences (3 percent), and other technical fields (7 percent). However, no differences were detected between the participation rates of students in education and those in mathematics and vocational studies (8 percent each) and computer sciences, business, and health studies (9 percent each). These results vary from institutional findings that showed that of the institutions that offered distance education courses in the 1997–98 academic year, 70 percent offered college-level, undergraduate distance education courses in English, the humanities, or the social and behavioral sciences, 55 percent offered such courses in business and management, and 29 percent offered them in education (Lewis et al. 1999).

In addition to major field of study, other academic characteristics seem to be related to 1999–2000 undergraduates' participation in distance education. For example, consistent with the finding that older students are more likely to participate, students who delayed entry into postsecondary education more than 2 years were more likely to participate in distance education than those who did not delay (10 versus 7 percent) (table 5). Students who attended part time, full year were more likely to participate in distance education classes than those with other attendance patterns, including those who attended full time, full year (10 versus 7 percent), full time, part year (5 percent), and part time, part year (7 percent). Additionally, students with two or more persistence risk factors[6] were more likely than those with zero or one risk factor to participate (9 versus 5 and 6 percent, respectively), as were students who took remedial courses as an undergraduate compared with those without remedial courses (9 versus 7 percent). However, there was no difference in the participation rates of students whose cumulative college grade-point average (GPA) was 2.99 or lower and those with a cumulative GPA of 3.00 or higher (7 and 8 percent, respectively). Taken together, most of these findings suggest that students who might be hindered in their ability to complete college—such as those who have taken remedial courses and those who are more likely to be at risk of not completing postsecondary education—participate in distance education at greater rates than their peers with fewer persistence risk factors or who need less remediation upon postsecondary enrollment.

Family responsibilities are not the only pull on students' time that might motivate them to try distance education courses. Undergraduates with greater employment responsibilities also tend to participate in distance education at greater rates than those of their peers with fewer work

[6]Index of risk represents an index of risk from 0–7 that is related to seven characteristics known to adversely affect persistence and attainment. These characteristics include delayed enrollment, no high school diploma (including GED recipients), part-time enrollment, financial independence, having dependents other than spouse, single-parent status, and working full time while enrolled.

Table 5.—Percentage of 1999–2000 undergraduate students who participated in distance education, and of those, the percentage whose entire program was taught through distance education, by students' academic performance and attendance pattern

	Total	Entire program taught through distance education
Total	7.6	29.0
High school degree		
High school diploma	7.6	29.1
GED, certificate, or foreign student	8.6	25.5
No high school diploma	3.1	(#)
Delayed enrollment into postsecondary education		
Did not delay	7.0	28.2
Delayed 1 to 2 years	8.2	29.3
Delayed more than 2 years	9.7	30.2
Attendance pattern		
Full-time, full-year	7.2	21.0
Full-time, part-year	5.3	34.6
Part-time, full-year	10.2	25.8
Part-time, part-year	7.4	44.5
Risk index*		
Zero	5.3	20.6
One	6.2	22.1
Two or more	9.3	32.8
College cumulative grade-point average		
Less than 3.00	7.3	27.8
3.00 and higher	8.0	29.4
Took any remedial courses		
One or more	8.9	27.8
None	7.1	29.7

#Too small to report.

*Represents an index of risk from 0–7 characteristics negatively associated with persistence and attainment. Characteristics include delayed enrollment, no high school diploma (including GED recipients), part-time enrollment, financial independence, having dependents other than spouse, single-parent status, and working full time while enrolled.

NOTE: Includes students who participated either only at the institution where they were primarily enrolled or both at the institution where they were primarily enrolled and somewhere else. Students who participated in distance education only at an institution other than the one where they were primarily enrolled were excluded.

SOURCE: U.S. Department of Education, National Center for Education Statistics, 1999–2000 National Postsecondary Student Aid Study (NPSAS:2000).

obligations. Students who worked full time were more likely than those who worked part time or did not work at all to participate in distance education classes (9 versus 7 and 6 percent,

respectively) (table 6). Also, students who considered themselves employees who study were more likely to participate than students who considered themselves students who work or who did not work (10 versus 7 and 6 percent, respectively). Students who worked were also more likely than those who did not work to take distance education classes (7 versus 6 percent).[7]

Table 6.—Percentage of 1999–2000 undergraduate students who participated in distance education, and of those, the percentage whose entire program was taught through distance education, by employment characteristics

	Total	Entire program taught through distance education
Total	7.6	29.0
Primary role		
Employee who studies	9.5	39.1
Student who works	7.3	22.4
Student who does not work	5.8	24.0
Work intensity while enrolled		
Full-time	9.1	34.9
Part-time	7.2	24.0
Did not work	5.8	24.0

NOTE: Includes students who participated either only at the institution where they were primarily enrolled or both at the institution where they were primarily enrolled and somewhere else. Students who participated in distance education only at an institution other than the one where they were primarily enrolled were excluded.

SOURCE: U.S. Department of Education, National Center for Education Statistics, 1999–2000 National Postsecondary Student Aid Study (NPSAS:2000).

Finally, though a difference was not detected, the relationship between students' disability status and participation in distance education was examined. Nine percent of students who reported having any disability and 8 percent of students who did not report any disability participated in distance education (table 1).

Overall, the results of this study show that among 1999–2000 undergraduates, several groups of students tended to participate in distance education at higher rates than others. These undergraduates were those with greater family and work responsibilities such as those who were older, were married, or had dependent children (figure 3).

[7]Students who worked while enrolled were asked, "While you were enrolled and working, would you say you were primarily a student working to meet expenses or an employee who decided to enroll in school?" Students were then categorized as "employees who study," "a student who works," or "a student who does not work."

Figure 3.—Percentage of 1999–2000 undergraduate students who participated in distance education, by students' background characteristics

NOTE: Includes students who participated either only at the institution where they were primarily enrolled or both at the institution where they were primarily enrolled and somewhere else. Students who participated in distance education only at an institution other than the one where they were primarily enrolled were excluded.

SOURCE: U.S. Department of Education, National Center for Education Statistics, 1999–2000 National Postsecondary Student Aid Study (NPSAS:2000).

Differences Among Graduate and First-Professional Students

In many ways, the patterns of participation in distance education among 1999–2000 graduate and first-professional students parallel those of undergraduates: those with more family and employment responsibilities tended to participate in distance education classes at higher rates than did their counterparts. Of graduate and first-professional students, 10 percent took distance education classes in 1999–2000.

However, unlike undergraduates, no gender differences were detected among graduate students, but there were racial/ethnic group differences. White graduate and first-professional students were more likely than Hispanic and Asian students to take such classes, but no differences were found between White students and either Black or American Indian students (table 7). Students whose primary language was English were more likely than those who were not primarily English language speakers to participate in distance education classes (11 versus 5 percent). Similar to undergraduates, no difference was detected in the rates of participation between graduate students who reported having any disabilities and those who did not.

Graduate and first-professional students whose parents' highest level of education was less than a bachelor's degree were more likely to participate than students whose parents had a

Table 7.—Percentage of 1999–2000 graduate and first-professional students who participated in distance education, and of those, the percentage whose entire program was taught through distance education, by student characteristics

	Total	Entire program taught through distance education
Total	10.0	38.0
Gender		
Male	10.0	37.0
Female	10.0	38.8
Race/ethnicity*		
White, non-Hispanic	11.0	37.5
Black, non-Hispanic	11.2	40.6
Hispanic	5.8	36.0
Asian	5.5	39.2
American Indian/Alaska Native	14.4	(#)
Pacific Islander/Native Hawaiian	2.6	(#)
Other	4.4	(#)
Primary language		
English	11.0	38.1
Other	5.0	36.7
Disability status		
Disability reported	12.2	31.4
No disability reported	9.9	38.7

#Too small to report.

*Following the Census 2000 model, NPSAS respondents were given the option of choosing more than one race. Those who chose more than one race were then asked: For historical purposes, could you please identify which single race best describes you? Priority was given to Hispanic/Latino regardless of race. Since so few students participate in distance education overall, the historical version of this variable (rather than the census version) was used to maximize the data by coding students who chose multiple races into the racial category they would pick if they could only choose one. See the RACE1 variable definition in the Glossary for further discussion.

NOTE: Includes students who participated either only at the institution where they were primarily enrolled or both at the institution where they were primarily enrolled and somewhere else. Students who participated in distance education only at an institution other than the one where they were primarily enrolled were excluded.

SOURCE: U.S. Department of Education, National Center for Education Statistics, 1999–2000 National Postsecondary Student Aid Study (NPSAS:2000).

bachelor's degree or higher (11 versus 9 percent) (table 8). Married students were more likely than students who were not married to take distance education courses (14 versus 7 percent), as were students with dependent children than those without dependent children (15 versus 8 percent). However, no difference in participation was detected between graduate and first-professional students who were single parents and those who were not (12 versus 10 percent).

Table 8.—Percentage of 1999–2000 graduate and first-professional students who participated in distance education, and of those, the percentage whose entire program was taught through distance education, by students' family background characteristics

	Total	Entire program taught through distance education
Total	10.0	38.0
Parent's highest level of education		
Less than a bachelor's degree	11.2	38.4
Bachelor's degree or higher	9.0	38.2
Marital status		
Married	13.7	38.9
Not married	6.8	36.7
Has dependent children		
One or more	15.0	43.4
None	7.5	32.8
Single parent status		
Single parent	11.8	49.6
Not a single parent	9.9	37.0

NOTE: Includes students who participated either only at the institution where they were primarily enrolled or both at the institution where they were primarily enrolled and somewhere else. Students who participated in distance education only at an institution other than the one where they were primarily enrolled were excluded.

SOURCE: U.S. Department of Education, National Center for Education Statistics, 1999–2000 National Postsecondary Student Aid Study (NPSAS:2000).

Graduate students who were enrolled in master's degree programs were more likely to participate in distance education than students enrolled in first-professional programs or doctoral programs (12 versus 3 and 6 percent, respectively) (table 9). Additionally, among students enrolled in master's degree programs at doctoral and nondoctoral institutions, those enrolled at public institutions were more likely to participate than those at private not-for-profit institutions (14 versus 10 percent). Students enrolled in master's programs at public institutions (doctoral and nondoctoral) were also more likely to participate than students enrolled in doctoral programs or students in first-professional programs, both public and private.

Like undergraduates, graduate and first-professional students who attended part time, full year were more likely to participate in distance education than students who attended full time, full year (13 versus 6 percent) (table 10). No differences were detected between students who attended part time, full year and those who attended either full time, part year (10 percent) or part time, part year (13 percent). Those who considered themselves employees who study were more

Table 9.—Percentage of 1999–2000 graduate and first-professional students who participated in distance education, and of those, the percentage whose entire program was taught through distance education, by degree and program characteristics

	Total	Entire program taught through distance education
Total	10.0	38.0
Graduate degree type		
Master's	12.3	38.1
First-professional	2.7	(#)
Doctorate	5.9	38.5
Other[1]	10.6	43.4
Graduate degree and institution type		
Master's degree, public	13.9	35.3
Master's degree, private, not-for-profit	9.5	46.4
First-professional, public	3.6	(#)
First-professional, private, not-for-profit	2.1	(#)
Doctoral degree, public	4.4	36.7
Doctoral degree, private, not-for-profit	8.0	45.9
Other[2]	11.8	36.5
Graduate and first-professional programs		
M.B.A./M.A./M.S./M.E.D.	12.3	38.1
Ph.D./Ed.D.	5.9	38.5
M.D./J.D./Theology/Other health sciences	2.7	(#)

#Too small to report.

[1]Includes postbaccalaureate certificates and "other" (unspecified).

[2]Includes "non-degree, public, non-doctoral," "non-degree, public, doctoral," and "other" (unspecified).

NOTE: Includes students who participated either only at the institution where they were primarily enrolled or both at the institution where they were primarily enrolled and somewhere else. Students who participated in distance education only at an institution other than the one where they were primarily enrolled were excluded.

SOURCE: U.S. Department of Education, National Center for Education Statistics, 1999–2000 National Postsecondary Student Aid Study (NPSAS:2000).

likely to take distance education classes than those who considered themselves students who work or students who do not work (15 versus 6 and 5 percent, respectively). Graduate and first-professional students who worked full time while enrolled were more likely than those who worked part time and those who did not work to participate (14 versus 6 and 5 percent, respectively).

Table 10.—Percentage of 1999–2000 graduate and first-professional students who participated in distance education, and of those, the percentage whose entire program was taught through distance education, by attendance and employment patterns

	Total	Entire program taught through distance education
Total	10.0	38.0
Attendance pattern		
Full-time, full-year	5.5	28.7
Full-time, part-year	10.1	38.6
Part-time, full-year	12.9	37.4
Part-time, part-year	13.0	43.8
Primary role		
Employee who studies	14.7	42.5
Student who works	5.9	26.1
Student who does not work	4.6	20.7
Work intensity while enrolled		
Work full-time	14.1	42.5
Work part-time	6.0	25.0
Does not work	4.6	20.7

NOTE: Includes students who participated either only at the institution where they were primarily enrolled or both at the institution where they were primarily enrolled and somewhere else. Students who participated in distance education only at an institution other than the one where they were primarily enrolled were excluded.

SOURCE: U.S. Department of Education, National Center for Education Statistics, 1999–2000 National Postsecondary Student Aid Study (NPSAS:2000).

Summary of Participation

Among undergraduate students, those with characteristics related to family and work responsibilities were more likely to participate in distance education. In particular, students who were older, were financially independent, had delayed postsecondary enrollment, were married, or had dependent children were all more likely to take distance education classes than their counterparts. Also, female undergraduates were more likely than males to participate. Undergraduate students who worked full time, considered themselves employees who study, or attended school part time participated in distance education in greater proportions than their counterparts. Perhaps due to the greater representation of such students at public 2-year colleges, undergraduates attending these institutions and those in associate's degree programs were more likely than other students to participate in distance education.

Similar patterns emerged among graduate students. Graduate and first-professional students who were married or had dependent children participated in distance education to a greater extent

than their counterparts. Those with greater employment responsibilities were also more likely than graduates with fewer responsibilities to take distance education courses. Master's degree students were more likely to participate in distance education than students in other graduate degree programs, with those attending public institutions participating in higher proportions than those at private not-for-profit institutions.

Availability of Entire Program Through Distance Education

Students who participated in distance education in 1999–2000 were asked in NPSAS:2000 if their entire program was taught through distance education. Since only 8 percent of undergraduates and 10 percent of graduate and first-professional students reported taking distance education courses, the sample of students responding to this question was small. Overall, however, 29 percent of 1999–2000 undergraduates who took distance education classes reported that their entire program was taught through distance education (table 1). Among 1999–2000 graduate and first-professional students, 38 percent reported the same (table 7). Graduate and first-professional students were more likely than undergraduates to say that their entire programs were taught through distance education, but the low incidence and resulting small sizes precluded making further subgroup comparisons among graduate and first-professional students.

On the other hand, some subgroup comparisons were possible among undergraduates and differences tended to parallel those found for overall participation. Among 1999–2000 undergraduates who participated in distance education, older undergraduates (i.e., students age 24 and over) were more likely than undergraduates under 24 to report that their entire program was taught via distance education (33 versus 24 percent) (table 1). Independent undergraduates were more likely than dependent undergraduates to say their entire program was taught through distance education (33 versus 23 percent), as were independent undergraduates who earned $50,000 or more than those who earned less than $50,000 (38 versus 31 percent) (table 2). Married undergraduates and undergraduates with dependent children were also more likely than their counterparts to report that their entire program was taught through distance education. In other words, the rates at which older undergraduates with family responsibilities participate in distance education and in programs that are taught entirely through distance education are greater than those of their more traditional counterparts.

Additionally, of undergraduates who participated in distance education, those enrolled at an institution in their state of legal residence were less likely than undergraduates enrolled at an out-of-state institution to report that their program was taught entirely through distance education (27 versus 44 percent). This finding varies from the previous one that showed that rates of participation did not differ between undergraduates who enrolled in institutions inside or outside their state of their legal residence. The finding suggests that undergraduates are willing to enroll out-of-state if the entire program is taught remotely (table 3).

Other academic and employment characteristics were also related to the likelihood that undergraduates reported their programs were entirely taught through distance education. Undergraduates with two or more persistence factors[8] that placed them at risk of not completing their postsecondary education who participated in distance education were more likely than their counterparts with zero or one risk factor to report that their programs were taught entirely through distance education (33 versus 21 and 22 percent, respectively) (table 5). Undergraduates who attended school part time, part year were more likely to say that their entire program was taught through distance education than those who attended full time, full year (45 versus 21 percent) and undergraduates who attended part time, full year (26 percent) (table 5).

Finally, undergraduates who worked full time were more likely than those who worked part time or who did not work (35 versus 24 each, respectively) to report that their programs were taught entirely through distance education. Undergraduates who considered themselves employees who study were also more likely to state their entire program was taught via distance education than undergraduates who considered themselves students who work or who do not work (39 versus 22 and 24 percent, respectively) (table 6). In other words, compared with their counterparts, undergraduates who had greater job or family responsibilities or more factors that placed them at risk of not completing their postsecondary education were more likely not only to report that they participated in distance education but also to report that their entire programs were taught through distance education.

[8]Represents an index of risk from 0–7 characteristics negatively associated with persistence and attainment. Characteristics include delayed enrollment, no high school diploma (including GED recipients), part-time enrollment, financial independence, having dependents other than spouse, single-parent status, and working full time while enrolled.

Distance Education Delivery Methods

A previous study on 1998–99 faculty participation in distance education showed that 6 percent of faculty taught computer-based distance education classes, 2 percent taught TV-based classes, and 2 percent taught a distance education class using other primary media (Bradburn 2002). These categories are not the same as the distance education technologies questions asked in NPSAS. Undergraduate and graduate students who responded that they had taken distance education classes were then asked, "Did your distance education classes use live interactive TV or audio? Prerecorded TV or audio? The Internet?" These categories are not mutually exclusive and the students could respond to having used multiple distance education methods.[9]

Among the 1999–2000 undergraduates who participated in distance education, a majority (60 percent) did so via the Internet (figure 4). About 37 percent participated via live, interactive TV or audio, and 39 percent participated using prerecorded TV or audio. It is unclear whether these results vary from the rates at which faculty use distance education technologies. The sample of faculty participating in distance education overall was too small to predict accurately the use of different media among those who did use distance education (Bradburn 2002). However, among the undergraduates, it is possible to report that those who participated in distance education were more likely to use the Internet than live or prerecorded TV or audio. No difference was detected in the proportions of students who took courses via live versus prerecorded TV or audio. Due to low incidence and resulting small sample sizes, subgroup comparisons among undergraduate students were not possible.

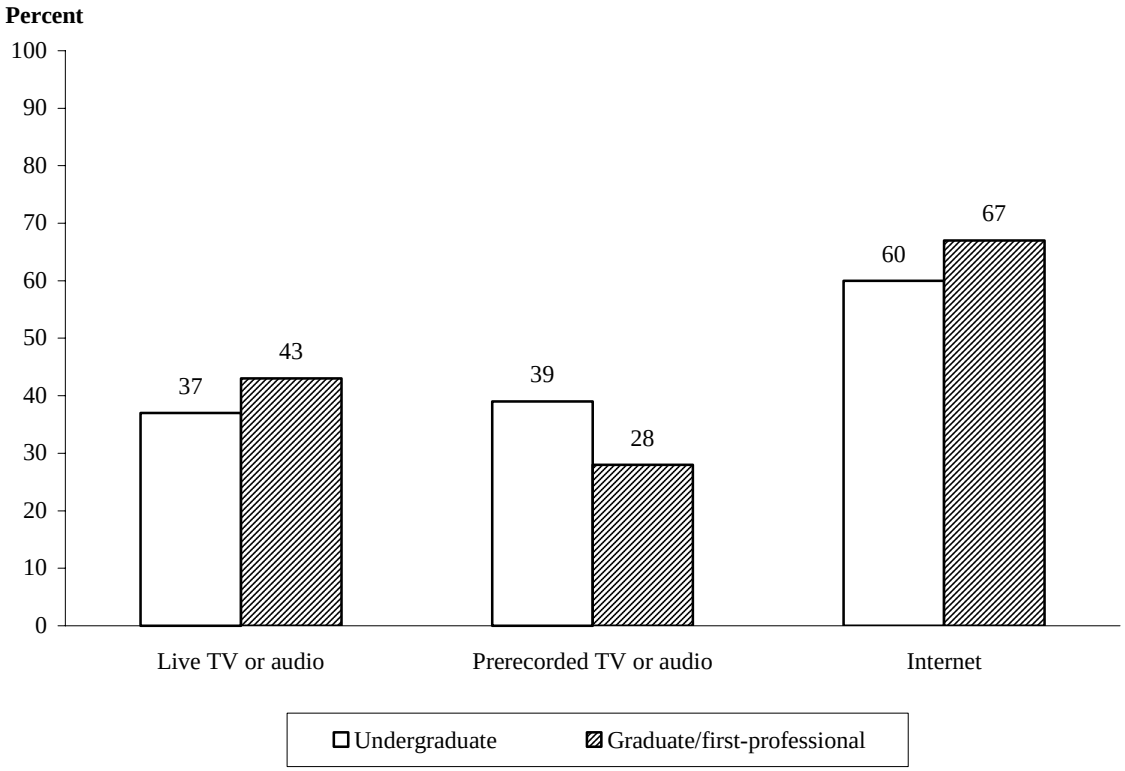
Among 1999–2000 graduate and first-professional students who took distance education classes, two-thirds (67 percent) did so via the Internet (figure 4). About 43 percent used live TV or audio, and 28 percent used prerecorded TV or audio.[10] Graduate and first-professional students were more likely to participate in distance education classes using the Internet than any other method and to use live TV or audio than prerecorded TV or audio. Low incidence and resulting small sample sizes among graduate and first-professional students prohibited further subgroup

[9]Students were not asked if they used multiple forms of distance education; however, by crossing participation in the three methods surveyed, results show that 54 percent of undergraduates who used live TV/audio and 51 percent of undergraduates who used prerecorded TV/audio also used the Internet. Fifty-three percent of undergraduates who used live TV/audio also used prerecorded TV/audio.

[10] Fifty-eight percent of graduate and first-professional students who used live TV or audio and 67 percent who used prerecorded TV or audio also used the internet. Thirty-six percent of graduate and first-professional students who used live TV/audio also used prerecorded TV/audio.

comparisons. Overall, among students who participated in distance education, graduate and first-professional students were less likely than undergraduates to use prerecorded TV or audio. But graduate students were more likely than undergraduates to participate in distance education courses via live TV or audio or the Internet.

Figure 4.—Among 1999–2000 undergraduate and graduate/first-professional students who participated in distance education, percentage who participated via live TV or audio, prerecorded TV or audio, or the Internet



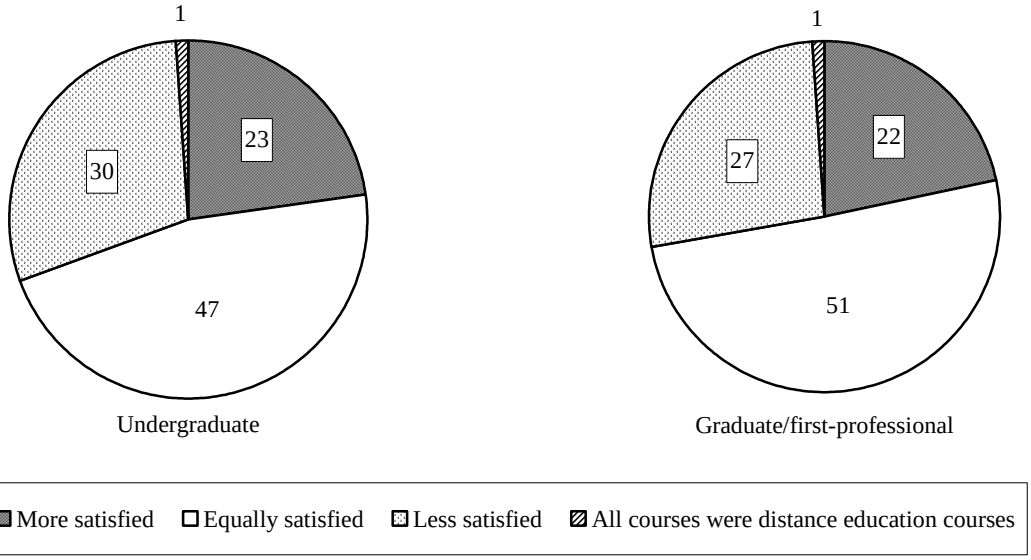
NOTE: Includes students who participated either only at the institution where they were primarily enrolled or both at the institution where they were primarily enrolled and somewhere else. Students who participated in distance education only at an institution other than the one where they were primarily enrolled were excluded.

SOURCE: U.S. Department of Education, National Center for Education Statistics, 1999–2000 National Postsecondary Student Aid Study (NPSAS:2000).

Satisfaction With Distance Education Classes

Undergraduate and graduate students who participated in distance education were asked, "Compared to other courses you've taken, are you more satisfied, equally satisfied, or less satisfied with the quality of instruction you've received in your distance education courses?" While this question did not apply to 7 percent of both undergraduates and graduate students who could not compare their satisfaction with distance education classes to regular classes because they had taken all of their courses through distance education, a majority of both graduate and undergraduate students who had participated in distance education were at least as satisfied or more satisfied with the quality of teaching in their distance education classes compared with their regular classes (figure 5). Among 1999–2000 undergraduates who participated in distance

Figure 5.—Among 1999–2000 undergraduate and graduate/first-professional students who participated in distance education, percentage distribution according to satisfaction with quality of instruction in distance education relative to classroom-based courses



NOTE: Includes students who participated either only at the institution where they were primarily enrolled or both at the institution where they were primarily enrolled and somewhere else. Students who participated in distance education only at an institution other than the one where they were primarily enrolled were excluded. Percentages may not add to 100 due to rounding.

SOURCE: U.S. Department of Education, National Center for Education Statistics, 1999–2000 National Postsecondary Student Aid Study (NPSAS:2000).

education, about one-quarter (23 percent) were more satisfied with the quality of instruction in their distance education classes than in their regular classes, and almost one-half (47 percent) were equally satisfied (table 11). Thirty percent were less satisfied with the instruction in their distance education classes when compared with their regular classes. While a majority of both undergraduates and graduates were at least as satisfied (equally or more satisfied) with their distance education classes as they were with their regular classes, a higher proportion of undergraduates were less satisfied than were more satisfied. Of 1999–2000 graduate and first-professional students who participated in distance education, 22 percent were more satisfied, 51 percent were equally satisfied, and 27 percent were less satisfied with their distance education classes than with their regular classes (table 12). No differences were detected between the proportions of undergraduate and graduate/first-professional students who reported being either more, equally, or less satisfied with their distance education classes.

Table 11.—Among 1999–2000 undergraduate students who participated in distance education, percentage distribution according to their satisfaction with the quality of instruction in distance education relative to classroom-based courses, by institution type, class level, and attendance pattern

	More satisfied	Equally satisfied	Less satisfied	All courses were distance education courses
Total	22.6	47.1	29.6	0.8
Institution type				
Public 2-year	24.0	45.1	30.0	0.9
4-year total	19.9	51.2	28.2	0.8
Public	20.2	51.1	28.2	0.6
Private not-for-profit	19.1	51.6	28.1	1.3
Private for-profit	20.1	41.2	38.7	0.0
Attendance pattern				
Full-time, full-year	19.2	49.1	31.7	0.0
Full-time, part-year	18.8	42.9	38.1	0.1
Part-time, full-year	25.1	44.5	29.0	1.4
Part-time, part-year	26.6	48.7	23.2	1.5
Class level				
1st through 3rd year	24.1	45.9	29.1	0.9
4th and 5th year (did not graduate)	19.6	51.6	28.3	0.6
Graduated 1999–2000	17.3	48.9	33.4	0.4

NOTE: Includes students who participated either only at the institution where they were primarily enrolled or both at the institution where they were primarily enrolled and somewhere else. Students who participated in distance education only at an institution other than the one where they were primarily enrolled were excluded.

SOURCE: U.S. Department of Education, National Center for Education Statistics, 1999–2000 National Postsecondary Student Aid Study (NPSAS:2000).

Table 12.—Among 1999–2000 graduate and first-professional students who participated in distance education, percentage distribution according to satisfaction with the quality of instruction in distance education relative to classroom-based courses, by institution type, class level, and attendance pattern

	More satisfied	Equally satisfied	Less satisfied	All courses were distance education courses
Total	21.8	51.1	26.7	0.5
Graduate degree type				
Master's or first-professional	21.5	50.7	27.3	0.5
Doctorate	22.8	38.7	38.5	0.0
Other	22.9	60.7	15.3	1.1
Attendance pattern				
Full-time, full-year	21.7	41.5	36.6	0.2
Full-time, part-year	27.8	50.7	21.6	0.0
Part-time, full-year	21.9	52.6	24.6	0.9
Part-time, part-year	20.1	55.3	24.2	0.4

NOTE: Includes students who participated either only at the institution where they were primarily enrolled or both at the institution where they were primarily enrolled and somewhere else. Students who participated in distance education only at an institution other than the one where they were primarily enrolled were excluded.

SOURCE: U.S. Department of Education, National Center for Education Statistics, 1999–2000 National Postsecondary Student Aid Study (NPSAS:2000).

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Multivariate Analysis

The results of the tabular analysis indicate that rates of participation in distance education tend to vary by the student characteristics associated with greater family and work responsibilities. That is, older and independent undergraduates and those with dependents and who worked full time tended to participate in greater proportions than their more traditional counterparts. These characteristics might be related to other factors associated with participation in distance education. Because many characteristics are interrelated, it is necessary to conduct a multivariate analysis that takes this covariation into account. See appendix B for a description of the multivariate procedure used here.

Tables 13 (undergraduates) and 14 (graduate and first-professional students) offer two estimates of the percentage of students who participated in distance education. The first column shows the unadjusted percentages participating for each characteristic, while the second column shows adjusted percentages after taking into account the covariation among all the independent variables in the table.

Differences Among Undergraduates

To identify how particular undergraduate student characteristics relate to participation in distance education, the multivariate analysis took the following independent variables into consideration: gender, race/ethnicity, age, primary language, parents' highest level of education, distance from home, risk index, marital status, single parent status, whether one has dependents, work intensity, delayed enrollment, remedial coursetaking, institution type, attendance pattern, degree program, and field of study (table 13). These variables were chosen because significant differences in rates of participation were found in the tabular analysis.

After controlling for the covariation of these variables, most of the characteristics found to be associated with higher levels of participation in distance education in the tabular analysis continued to be so in the multivariate analysis. Among 1999–2000 undergraduates, females were more likely than males to participate in distance education, as were students age 24 and over than their younger counterparts. Students who had one or two or more risk factors, married students, and students with dependent children also participated at higher rates than their peers. However, while the unadjusted percentages of students who primarily spoke any language other than

Table 13.—Among 1999–2000 undergraduates, percentage participating in distance education courses and the adjusted percentage after controlling for covariation in the variables listed in the table: Fall 2000[1]

	Unadjusted percentage[2]	Adjusted percentage[3]	Least squares coefficient[4]	Standard error[5]
Total	7.6	7.6	9.76	0.00
Gender				
Female	8.5*	8.2*	1.40	0.33
Male	*6.5*	*6.8*	*†*	*†*
Race/ethnicity[6]				
Black, non-Hispanic	7.9	7.2	-0.73	0.48
Hispanic or Latino	6.2	6.5*	-1.40	0.56
Asian	5.8	7.4	-0.52	0.79
American Indian/Alaska Native	11.0	9.9	1.96	1.55
Pacific Islander/Native Hawaiian	8.5	9.8	1.88	1.63
Other	4.3	5.3*	-2.62	1.19
White, non-Hispanic	*8.0*	*7.9*	*†*	*†*
Age				
24 and over	9.9*	8.9*	2.26	0.46
Under 24	*6.0*	*6.7*	*†*	*†*
Primary language				
Other, not English	6.3*	7.1	-0.60	0.57
English	*7.8*	*7.7*	*†*	*†*
Parents' highest level of education				
Bachelor's degree or higher	6.7*	7.5	-0.23	0.32
Less than bachelor's degree	*8.3*	*7.7*	*†*	*†*
Distance from home				
10 or more miles	8.2*	8.7*	2.58	0.32
Less than 10 miles	*6.8*	*6.1*	*†*	*†*
Risk index[7]				
Zero	*5.3*	*6.2*	*†*	*†*
One	6.2	7.4*	1.12	0.53
Two or more	9.3*	8.4*	2.18	0.74
Marital status				
Not married	6.7*	7.2*	-1.89	0.61
Married	*10.9*	*9.1*	*†*	*†*

See footnotes at end of table.

Table 13.—Among 1999–2000 undergraduates, percentage participating in distance education courses and the adjusted percentage after controlling for covariation in the variables listed in the table: Fall 2000[1]—Continued

	Unadjusted percentage[2]	Adjusted percentage[3]	Least squares coefficient[4]	Standard error[5]
Dependent children				
Has dependent children	10.9*	8.6*	1.29	0.60
Does not have children	*6.5*	*7.3*	*†*	*†*
Single parent status				
Not a single parent	7.4*	7.5	-0.96	0.76
Single parent	*9.8*	*8.5*	*†*	*†*
Work intensity while enrolled				
Did not work	5.8*	6.2*	-1.78	0.47
Worked part-time	7.2*	8.0	0.01	0.42
Worked full-time	*9.1*	*8.0*	*†*	*†*
Delayed enrollment into postsecondary education				
1 to 2 years	8.2	7.7	0.00	0.47
More than 2 years	9.7*	7.4	-0.32	0.47
Did not delay	*7.0*	*7.7*	*†*	*†*
Took any remedial courses				
Have taken remedial courses	8.9*	8.4*	1.12	0.33
Have not taken remedial courses	*7.1*	*7.3*	*†*	*†*
Institution type				
Public 4-year	6.9*	7.4	-1.18	0.62
Private not-for-profit 4-year	6.1*	6.3*	-2.28	0.70
Private for-profit	3.8*	3.8*	-4.74	0.79
Other	8.2	8.5	-0.01	0.64
Public 2-year	*9.0*	*8.5*	*†*	*†*
Attendance pattern				
Full-time/full year	7.2*	9.0	0.59	0.50
Full-time/part year	5.3*	6.1*	-2.28	0.56
Part-time/part year	7.4*	5.4*	-2.98	0.45
Part-time/full year	*10.2*	*8.4*	*†*	*†*
Degree program				
Certificate	6.2	5.3*	-2.30	0.68
Associate's degree	9.6*	8.8*	1.21	0.60
No undergraduate degree	5.4	5.4*	-2.19	1.01
Bachelor's degree	*6.6*	*7.6*	*†*	*†*

See footnotes at end of table.

Table 13.—Among 1999–2000 undergraduates, percentage participating in distance education courses and the adjusted percentage after controlling for covariation in the variables listed in the table: Fall 2000[1]—Continued

	Unadjusted percentage[2]	Adjusted percentage[3]	Least squares coefficient[4]	Standard error[5]
Undergraduate field of study				
Health	6.8	7.3*	-3.10	0.71
Vocational/technical	8.3	8.1*	-2.29	0.86
Other technical/professional	7.2	7.9*	-2.47	0.74
Humanities	6.8*	6.7*	-3.66	0.67
Social/behavioral sciences	6.6*	7.0*	-3.35	0.74
Life sciences	5.5*	6.1*	-4.30	0.87
Physical sciences	3.3*	3.3*	-7.06	1.54
Math	8.2	8.7	-1.71	1.94
Computer/information science	8.9	9.0	-1.32	0.77
Engineering	4.6*	5.4*	-4.94	0.85
Business/management	8.9	8.7*	-1.71	0.64
Undeclared/no major	5.5*	6.3*	-4.11	0.86
Education	*11.1*	*10.4*	*†*	*†*

*p ≤ .05.

†Not applicable for the reference group.

[1]The italicized group in each category is the reference group being compared.

[2]The estimates are from the NPSAS:2000 Undergraduate Data Analysis System.

[3]The percentages are adjusted for differences associated with other variables in the table (see appendix B).

[4]Weighted least squares (WLS) coefficient, multiplied by 100 to reflect percentage (see appendix B).

[5]Standard error of WLS coefficient, adjusted for design effect, multiplied by 100 to reflect percentage (see appendix B).

[6]Following the census 2000 model, NPSAS respondents were given the option of choosing more than one race. Those who chose more than one race were then asked: For historical purposes, could you please identify which single race best describes you? Priority was given to Hispanic/Latino regardless of race, and then to the response of those who chose more than one race to the "historical" choice question.

[7]Represents an index of risk from 0–7 related to seven characteristics known to adversely affect persistence and attainment. Characteristics include delayed enrollment, no high school diploma (including GED recipients), part-time enrollment, financial independence, having dependents other than spouse, single-parent status, and working full time while enrolled.

SOURCE: U.S. Department of Education, National Center for Education Statistics, 1999–2000 National Postsecondary Student Aid Study (NPSAS:2000).

English or whose parents' highest level of education was a bachelor's degree or higher were lower than their counterparts, no differences in the adjusted percentages were found. In other words, after taking the other variables into account, primary language and parents' highest education did not appear to be related to participation in distance education.

After taking all other independent variables into consideration, greater work intensity and attending school part year continued to be associated with higher levels of participation in distance education. Students who did not work were less likely than those who worked full time to participate in distance education courses, while students who attended school part time, full

year were more likely than both those who attended full time, part year and those who attended part time, part year to participate.

Also, students at public 2-year institutions were more likely to participate in distance education than those at private not-for-profit 4-year and private for-profit institutions. Students in bachelor's degree programs were more likely to participate in distance education than those in certificate programs or those who were in no degree program; however, they were less likely to participate than those in associate's degree programs. Finally, undergraduates studying education were more likely to participate in distance education than students in all other fields (undeclared, health, vocational/technical, humanities, other technical/professional, social/behavioral sciences, life sciences, physical sciences, engineering, and business management) except for mathematics and computer/information science.

Differences Among Graduate and First-Professional Students

To identify how particular graduate and first-professional student characteristics relate to participation in distance education, the multivariate analysis took the following independent variables into consideration: gender, race/ethnicity, primary language, marital status, parents' highest level of education, single parent status, whether one has dependents, work intensity, degree and institution type, and attendance pattern (table 14).

Unlike the results found for undergraduates, after controlling for the covariation of these variables, gender was not associated with higher levels of participation in distance education. However, married students, students with dependent children, and those who worked full time all participated in greater proportions than did their counterparts.

With respect to their degree program, graduate students in master's degree programs at public institutions were more likely than those in master's degree programs at a private institution to participate in distance education. No differences were detected, however, between graduate students in master's degree programs at public institutions and those in doctoral or first-professional degree programs at either public or private institutions. Among 1999–2000 graduate and first-professional students, no relationship between attendance pattern and participation was detected.

Table 14.—Among 1999–2000 graduate and first-professional students, percentage participating in distance education courses and the adjusted percentage after controlling for covariation in the variables listed in the table: Fall 2000[1]

	Unadjusted percentage[2]	Adjusted percentage[3]	Least squares coefficient[4]	Standard error[5]
Total	10.0	10.0	18.04	2.42
Gender				
Female	10.0	9.7	-0.62	0.76
Male	*10.0*	*10.4*	*†*	*†*
Race/ethnicity[6]				
Black, non-Hispanic	11.2	9.6	-0.78	1.39
Hispanic or Latino	5.8*	6.6*	-3.77	1.67
Asian	5.5*	9.9	-0.50	1.54
American Indian/Alaska Native	14.4	14.9	4.50	5.11
Pacific Islander/Native Hawaiian	2.6	4.2	-6.18	5.07
Other	4.4	8.0	-2.45	2.93
White, non-Hispanic	*11.0*	*10.4*	*†*	*†*
Primary language				
English	*11.0*	*10.5*	*†*	*†*
Other, not English	5.0*	7.6*	-2.83	1.33
Parents' higher education				
Bachelor's degree or higher	9.0*	10.1	0.16	0.76
Less than a bachelor's degree	*11.2*	*9.9*	*†*	*†*
Marital status				
Not married	6.8*	8.5*	-3.28	1.02
Married	*13.7*	*11.8*	*†*	*†*
Has dependent children				
One or more	15.0*	12.4*	3.59	1.07
None	*7.5*	*8.8*	*†*	*†*
Single parent status				
Not a single parent	9.9	10.0	-0.27	1.76
Single parent	*11.8*	*10.2*	*†*	*†*
Work intensity while enrolled				
Did not work	4.6*	6.7*	-5.82	1.18
Worked part-time	6.0*	7.3*	-5.29	1.03
Worked full-time	*14.1*	*12.5*	*†*	*†*

See footnotes at end of table.

Table 14.—Among 1999–2000 graduate and first-professional students, percentage participating in distance education courses and the adjusted percentage after controlling for covariation in the variables listed in the table: Fall 2000[1]—Continued

	Unadjusted percentage[2]	Adjusted percentage[3]	Least squares coefficient[4]	Standard error[5]
Graduate degree and institution type				
Master's degree, public	*13.9*	*9.1*	*†*	*†*
Master's degree, private, not-for-profit	9.5*	4.3*	-4.76	0.97
Doctoral degree, public	4.4*	8.5	-0.59	5.69
Doctoral degree, private, not-for-profit	8*	12.0	2.95	5.80
First-professional, public	3.6*	22.5	13.41	15.13
First-professional, private, not-for-profit	2.1*	20.1	11.04	15.10
Other[7]	11.8	12.8	3.71	2.45
Graduate degree type				
Doctorate	5.9*	7.4	-6.85	5.50
First-professional	2.7*	-4.7	-18.97	15.00
Other[8]	10.6	6.2*	-8.06	2.61
Master's	*12.3*	*14.3*	*†*	*†*
Attendance pattern				
Full-time, full year	5.5*	9.5	-0.74	1.10
Full-time, part year	10.1	11.6	1.40	1.50
Part-time, part year	13.0	10.0	-0.17	1.01
Part-time, full year	*12.9*	*10.2*	*†*	*†*

*$p \leq .05$.

†Not applicable for the reference group.

[1]The italicized group in each category is the reference group being compared.

[2]The estimates are from the NPSAS:2000 Undergraduate Data Analysis System.

[3]The percentages are adjusted for differences associated with other variables in the table (see appendix B).

[4]Weighted least squares (WLS) coefficient, multiplied by 100 to reflect percentage (see appendix B).

[5]Standard error of WLS coefficient, adjusted for design effect, multiplied by 100 to reflect percentage (see appendix B).

[6]Following the census 2000 model, NPSAS respondents were given the option of choosing more than one race. Those who chose more than one race were then asked: For historical purposes, could you please identify which single race best describes you? Priority was given to Hispanic/Latino regardless of race, and then to the response of those who chose more than one race to the "historical" choice question.

[7]Includes postbaccalaureate certificates and "other" (unspecified).

[8]Includes "non-degree, public, non-doctoral," "non-degree, public, doctoral," and "other" (unspecified).

SOURCE: U.S. Department of Education, National Center for Education Statistics, 1999–2000 National Postsecondary Student Aid Study (NPSAS:2000).

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Conclusion

While the proportions of 1999–2000 undergraduates and graduate and first-professional students who participated in distance education were relatively small (8 percent and 10 percent, respectively), clear patterns of participation emerged for both groups. Among undergraduates, characteristics associated with family and work responsibilities—being independent, older, or married or having dependents—appeared to be associated with greater levels of participation in distance education. Gender was related to participation as well: females were more likely than males to participate even when accounting for covariation among the variables. The participation rates of undergraduates who attended public 2-year institutions and those seeking associate's degrees also tended to be higher than those of their counterparts in other types of institutions and degree programs. Finally, greater proportions of 1999–2000 undergraduates who had majored in education participated in distance education than did students majoring in most other fields of study, even in the multivariate analysis. Among undergraduates who reported participating, those groups with higher overall participation were also generally more likely than their counterparts to report that their entire program was available through distance education.

Similar patterns of participation emerged among graduate and first-professional students. While a gender difference was not detected, married students and those with dependent children were more likely than their counterparts to participate in distance education. Greater work intensity also appeared to contribute to higher participation both before and after accounting for covariation among the variables. Due to small sample sizes, it was not possible to conduct subgroup comparisons of the availability of graduate and first-professional students' entire programs via distance education.

Among those who took distance education classes, both graduate and undergraduate students were more likely to use the Internet than either live or prerecorded TV or audio. Graduate and first-professional students were less likely than undergraduates to use prerecorded TV or audio but were more likely than undergraduates to participate in distance education courses via live TV, audio, or the Internet. Finally, undergraduates and graduate/first-professional students did not differ in their levels of satisfaction: the majority of both groups were at least "equally satisfied" with their distance education courses compared with their regular courses.

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Appendix A—Glossary

This glossary describes the variables used in this report. The items were taken directly from the NCES NPSAS:2000 undergraduate and graduate Data Analysis Systems (DAS). The DAS is a software application that generates tables from the NPSAS:2000 data (see appendix B for a description of the DAS). The variables listed in the index below are organized by sections in the order they appear in the report; the glossary is in alphabetical order by variable name (displayed along the right-hand column). Some items were reported by the student only during the Computer-Assisted Telephone Interview (CATI). Variables based only on CATI respondents are identified.

Glossary Index

ENROLLMENT, ATTENDANCE, AND INSTITUTIONAL CHARACTERISTICS

Attendance status ..... ATTNSTAT
Delayed enrollment ..... DELAYENR
Distance from home ..... NXDSTSCH
Graduate program and institution type ..... PGMSEC
Attend institution in state of legal residence ..... SAMESTAT
Sector of institution SECTOR4

DEGREE PROGRAM, FIELD OF STUDY, GPA, AND COURSE TAKING

Undergraduate program ..... DEGFIRST
Cumulative grade point average GPA2
Graduate degree type ..... GRADDEG
Graduate and first-professional programs GRADPGM2
Major field of study MAJORS3
Ever taken remedial courses ..... NEREMEVR

STUDENT CHARACTERISTICS

Age as of 12/31/99 ..... AGE
Dependency status 1999–2000 ..... DEPEND
Income of parents of dependent students ..... DEPINC
Gender ..... GENDER
High school degree or equivalency status ..... HSDEG
Income of independent students 1998 ..... INDEPINC
Has dependent children ..... NBDEPS
Primary language spoken at home ..... NBLANG
Any disability reported ..... NFANYDIS
Parents' education ..... NPARED
Race RACE1
Number of risk factors ..... RISKINDX
Single parent ..... SINGLPAR
Marital status ..... SMARITAL
Undergraduate class level UGLVL1

WORK

Average hours worked per week while enrolled ..... ENRJOB
Primary role if working while enrolled ..... SEROLE

DISTANCE EDUCATION

Distance education—satisfaction ..... NECMPSAT
Where distance education course(s) taken ..... NEDSLOC
Distance education courses ..... NEDSTED
Entire program available through distance education ..... NEENTPGM
Distance education participation—live ..... NELIVE
Distance education participation—prerecorded ..... NERECORD
Distance education participation—Internet ..... NENET

DAS VARIABLE NAME

Age as of 12/31/99 **AGE**

Indicates student's age on 12/31/1999. Students who are 24 on or before this date are considered independent for financial aid purposes in the 1999–2000 academic year. Calculated from date of birth.

Attendance status **ATTNSTAT**

Combined attendance intensity and persistence during 1999–2000. Intensity refers to the student's full- or part-time attendance while enrolled. Persistence refers to the number of months a student was enrolled during the year. Students were considered to have been enrolled for a full year if they were enrolled eight or more months during 1999–2000. Months did not have to be contiguous or at the same institution, and students did not have to be enrolled for a full month in order to be considered enrolled for that month. In prior NPSAS surveys, full year had been defined as nine or more months. Includes enrollment at all institutions.

Full-time, full-year	Student was enrolled full time for at least eight months during 1999–2000. Additional months enrolled could be part time.
Full-time, part-year	Student was enrolled full time for less than eight months during 1999–2000 and attending full time in all of these months.
Part-time, full-year	Student was enrolled eight or more months during 1999–2000, and some of these months were part time.
Part-time, part-year	Student was enrolled less than eight months during 1999–2000, and some of these months were part time.

Undergraduate program **DEGFIRST**

Degree program in which student was enrolled in the first term, as reported by the institution. If not available from the institution, information was taken from student interview. Refers to NPSAS institution for those enrolled in more than one institution.

Certificate	Student pursuing a certificate or formal award other than an associate's or bachelor's degree.
Associate's degree	Student pursuing an associate's degree.
Bachelor's degree	Student pursuing a Bachelor of Arts or Bachelor of Science degree.
No degree program	Student is not in any of the above degree programs.

Delayed enrollment **DELAYENR**

Number of years between the year of high school graduation and the first year enrolled in postsecondary education.

DAS VARIABLE NAME

Dependency status 1999–2000 **DEPEND**

Student dependency status for federal financial aid. Students under age 24 are generally considered to be dependent on their parents for financial support. Students were considered to be independent in 1999–2000 if they met any of the following criteria:

1) Age twenty-four or older as of 12/31/1999
2) A veteran of the U.S. Armed Forces
3) Enrolled in a graduate or professional program beyond a bachelors degree
4) Married
5) Orphan or ward of the court
6) Have legal dependents other than a spouse

Students under 24 who do not meet any of these conditions but are receiving no parental support may be classified as independent by campus financial aid officers using their professional judgment.

Dependent
Independent

Income of parents of dependent students **DEPINC**

Indicates dependent student parents' total income for 1998.

Average hours worked per week while enrolled **ENRJOB**

Average number of hours per week that students reported working while enrolled in 1999–2000. It is based on the student CATI question "About how many hours did you work per week while you were enrolled?" The variable does not include hours worked when student was not enrolled.

Did not work	Student did not work.
Worked part time	Student worked less than 35 hours per week while enrolled.
Worked full time	Student worked more than 35 hours per week while enrolled.

Gender **GENDER**

Male
Female

Cumulative grade point average **GPA2**

Student's GPA reported by the institution recoded into a 4.0 scale. If the data were not available, the student-reported categorical GPAs were used. Refers to NPSAS institution for those enrolled in more than one institution.

DAS VARIABLE NAME

Graduate degree type **GRADDEG**

Indicates the general type of graduate degree program in which the student was enrolled in 1999–2000. NCES defines first-professional programs to include the following ten fields of study: dentistry, medicine, optometry, osteopathic medicine, pharmacy, podiatric medicine, veterinary medicine, chiropractic, law, and theological professions.

Master's
Doctorate
First-professional
Post-baccalaureate certificate
Other

Graduate and first-professional programs **GRADPGM2**

Graduate and first-professional program type

M.B.A./M.A./M.S./M.E.D.
Ph.D./Ed.D.
M.D./J.D./Theology/Other health sciences

High school degree or equivalency status **HSDEG**

Form in which high school degree or equivalent was received.

High school diploma	Student graduated from high school.
GED, high school equivalent, or certificate	Student did not graduate from high school but passed the General Educational Development (GED) exam or high school equivalent, administered by the American Council on Education, or received a certificate of completion.
No high school degree/certificate	Student neither graduated from high school nor earned a GED or certificate of completion.

Income of independent students 1998 **INDEPINC**

Total income of independent students in 1998, including income of a spouse.

Major field of study **MAJORS3**

Undergraduate major field of study among those with declared majors. Refers to NPSAS institution for those enrolled in more than one institution.

DAS VARIABLE NAME

Major field of study, continued

Undeclared/no major	No declared major
Humanities	English, liberal arts, philosophy, theology, art, music, speech/drama, art history/fine arts, area studies, African-American studies, ethnic studies, foreign languages, liberal studies, women's studies.
Social/behavioral sciences	Psychology, economics, political science, American civilization, clinical pastoral care, social work, anthropology/archaeology, history, sociology.
Life sciences	Natural resources, forestry, biological science (including zoology), botany, biophysics, geography, interdisciplinary studies, including biopsychology, environmental studies.
Physical sciences	Physical sciences including chemistry, physics.
Math	Mathematics, statistics.
Computer/information science	Computer/information science, computer programming.
Engineering	Electrical, chemical, mechanical, civil, or other engineering; engineering technology; electronics.
Education	Early childhood, elementary, secondary, special, or physical education; other education; leisure studies; library/archival sciences.
Business management	Accounting, finance, secretarial, data processing, business/management systems, public administration, marketing/distribution, business support, international relations.
Health	Nursing, nurse assisting, community/mental health, medicine, physical education/recreation, audiology, clinical health, dentistry, veterinary medicine, health/hospital, public health, dietetics, other/general health.
Vocational/technical	Mechanic technology including transportation, protective services, construction, air/other transportation, precision production.
Other technical/professional	Agriculture, agricultural science, architecture, professional city planning, journalism, communications, communications technology, cosmetology, textiles, military science, dental/medical technology, home economics, vocational home economics including child care, law, paralegal, basic/personal skills.

DAS VARIABLE NAME

Has dependent children **NBDEPS**

Student's response to the question "When you were enrolled in the 1999–2000 school year, did you have any children that you (and your spouse) supported financially?" Asked by student CATI.

Has dependent children
Does not have dependent children

Primary language spoken at home **NBLANG**

Student's response to the question "What language was spoken most often at home as you were growing up?" Asked by student CATI.

English
Other

Distance education—satisfaction **NECMPSAT**

Student's response to the question "Compared to other courses you've taken, are you more satisfied, equally satisfied, or less satisfied with the quality of instruction you've received in your distance education courses?" Asked by student CATI.

More satisfied
Liked both the same
Less satisfied
All courses were distance education courses
Did not take distance education

Where distance education course(s) taken **NEDSLOC**

Student's response to the question "Was this course (or courses) offered through your school where primarily enrolled, somewhere else, or both?" Asked by student CATI.

Target school where primarily enrolled
Somewhere else
Both
Did not take distance education courses

Distance education courses **NEDSTED**

Student's response to the question: "During the 1999–2000 school year, did you take any courses for credit that were distance education courses? By distance education, I mean courses delivered off campus using live, interactive TV or audio, prerecorded TV or video, CD-ROM, or a computer-based system such as the Internet, e-mail, or chat rooms." Distance education does not include correspondence courses. Asked by student CATI.

Took distance education course
Did not take distance education course

DAS VARIABLE NAME

Distance education—entire program **NEENTPGM**

Student response to the question: "Is your entire program taught through distance education?" Asked by student CATI.

Entire program not distance education
Entire program distance education
Did not take distance education

Distance education—live **NELIVE**

Student's response to the question: "Did your distance education classes use live, interactive TV or audio?" Asked by student CATI.

Used live TV/audio
Did not use live TV/audio

Distance education—Internet **NENET**

Student's response to the question: "Did your distance education classes use the Internet?" Asked by student CATI.

Used the Internet
Did not use the Internet

Distance education—prerecorded **NERECORD**

Student's response to the question: "Did your distance education classes use prerecorded TV or audio?" Asked by student CATI.

Used prerecorded TV/audio
Did not use prerecorded TV/audio

Ever taken remedial courses **NEREMEVR**

Student's response to the question: "Since you've been in college, have you ever taken remedial or developmental courses to improve your basic skills, such as in mathematics, reading, or writing?"

Yes
No

Any disability reported **NFANYDIS**

A derived variable that indicates whether the respondent has reported any type of disability at all, based on responses to the first set of questions in the disability section of the interview.

Disability reported
No disability reported

DAS VARIABLE NAME

Parents' education **NPARED**

The highest level of education completed by the student's mother or father, whoever had the highest level. The variable was aggregated to the following categories in this report:

Less than a bachelor's degree	Students' parents earned a high school diploma or equivalent or did not complete high school. This includes students' parents who may have attended some postsecondary education, but did not earn a bachelor's degree.
Bachelor's degree or higher	Students' parents attained a bachelor's or advanced degree.

Distance from home **NXDSTSCH**

The straight-line distance (in miles) between student's home and NPSAS institution.

Graduate program and institution type **PGMSEC**

Indicates the type of NPSAS sample institution and the type of degree program in which graduate/first-professional students were enrolled. Graduate students sampled at less-than-4-year institutions (where they were taking undergraduate courses) are classified as 'other'.

Masters degree, public
Masters degree, private
First-professional, public
First-professional, private
Doctoral degree, public
Doctoral degree, private
Other

Race **RACE1**

Student's race/ethnicity by historical categories used in prior surveys. Students choosing more than one race were asked "For historical purposes, could you please identify which single race best describes you?" Since so few students participate in distance education overall, the historical version of this variable (rather than the census version) was used to maximize the sample size of each racial/ethnic category by coding students who chose multiple races into the racial category they would pick if they could only choose one.

Two percent of 1999–2000 undergraduates chose more than one race (Horn et al. 2002). When asked to choose one race, 31 percent of those undergraduates chose White, non-Hispanic, 13 percent chose Black, non-Hispanic, 27 percent chose Hispanic, 10 percent chose Asian, 6 percent chose American Indian/Alaska Native, 3 percent chose Pacific Islander/Native Hawaiian, and 10 percent chose Other (NPSAS:2000).

Two percent of all graduate and first-professional students chose more than one race. When asked to select one race for historical purposes, 29 percent of those graduate and first-professional students selected White, non-Hispanic, 11 percent selected Black, non-Hispanic, 22 percent selected Hispanic, 18 percent selected Asian, 3 percent selected American Indian/Alaska Native, 6 percent selected Pacific Islander/Native Hawaiian, and 11 percent selected Other (NPSAS:2000).

DAS VARIABLE NAME

Race, continued

White, non-Hispanic	A person having origins in any of the original peoples of Europe, North Africa, or the Middle East.
Black, non-Hispanic	A person having origins in any of the black racial groups of Africa.
Hispanic or Latino	A person of Mexican, Puerto Rican, Cuban, Central or South American, or other Spanish culture or origin, regardless of race.
Asian	A person having origins in any of the peoples of the Far East, Southeast Asia, or the Indian subcontinent. This includes people from China, Japan, Korea, the Philippine Islands, India, and Vietnam.
American Indian/Alaska Native	A person having origins in any of the original peoples of North America and who maintains cultural identification through tribal affiliation or community recognition.
Pacific Islander/Native Hawaiian	A person having origins in the Pacific Islands including Hawaii and Samoa.
Other	A person having origins in a race not listed above.

Number of risk factors **RISKINDX**

Represents an index of risk of 0–7 related to seven characteristics known to adversely affect persistence and attainment. Characteristics include delayed enrollment, no high school diploma (including GED recipients), part-time enrollment, financial independents, having independents other than spouse, single parent status, and working part-time while enrolled.

Attend institution in state of legal residence **SAMESTAT**

Indicates whether the sampled NPSAS institution was in the same state as the state of legal residence of the student.

Attended in same state as legal residence
Attended out-of-state institution

Sector of institution **SECTOR4**

Indicates type of institution.

Public 4-year
Private not-for-profit 4-year
Public 2-year
Private for-profit

DAS VARIABLE NAME

Primary role if working while enrolled **SEROLE**

Student response to the question "While you were working, would you say that you were primarily a student working to meet expenses or an employee who's decided to enroll in school?" Asked by student CATI.

Student who works	Student working to meet expenses
Employee who studies	Employee enrolled in school
Does not work	Respondent does not work

Single parent **SINGLPAR**

Indicates whether student was a single parent in 1999–2000. Students were considered to be single parents if they had dependents and were not married.

Single parent
Not a single parent

Marital status **SMARITAL**

Marital status of student when applied for financial aid in 1999–2000.

Married
Not married (including separated)

Undergraduate class level **UGLVL1**

Year in school. A function of class level reported by the institution for the first term in college. If not available from the institution, information was taken from the financial aid form, loan record, or student interview. Refers to NPSAS institution for those enrolled in more than one institution.

First, second, or third-year undergraduates
Graduating seniors
Graduated 1999–2000 or other

Appendix B—Technical Notes and Methodology

The 1999–2000 National Postsecondary Student Aid Study

The 1999–2000 National Postsecondary Student Aid Study (NPSAS:2000) is a comprehensive nationwide study conducted by the U.S. Department of Education's National Center for Education Statistics (NCES) to determine how students and their families pay for postsecondary education.[11] It also describes demographic and other characteristics of students enrolled. The study is based on a nationally representative sample of all students in postsecondary education institutions, including undergraduate, graduate, and first-professional students. For NPSAS:2000, information was obtained from more than 900 postsecondary institutions on approximately 50,000 undergraduate, 9,000 graduate, and 3,000 first-professional students. They represented about 16.5 million undergraduates, 2.4 million graduate students, and 300,000 first-professional students who were enrolled at some time between July 1, 1999 and June 30, 2000.[12]

Accuracy of Estimates

The statistics in this report are estimates derived from a sample. Two broad categories of error occur in such estimates: sampling and nonsampling errors. Sampling errors occur because observations are made only on samples of students, not entire populations. Nonsampling errors occur not only in sample surveys but also in complete censuses of entire populations. Nonsampling errors can be attributed to a number of sources: inability to obtain complete information about all students in all institutions in the sample (some students or institutions refused to participate, or students participated but answered only certain items); ambiguous definitions; differences in interpreting questions; inability or unwillingness to give correct information; mistakes in recording or coding data; and other errors of collecting, processing, sampling, and imputing missing data.

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[11]For more information on the NPSAS survey, consult U.S. Department of Education, National Center for Education Statistics, *Methodology Report for the 1999–2000 National Postsecondary Student Aid Study* (NCES 2002–152) (Washington, DC: 2001). Additional information is also available at the NPSAS Web site *http://nces.ed.gov/npsas*.

[12]For response rates, see tables A3 and A4 in A. Malizio, *National Postsecondary Student Aid Study: Student Financial Aid Estimates for 1999–2000* (NCES 2001–209) (Washington, DC: U.S. Department of Education, National Center for Education Statistics, 2001).

Data Analysis System

The estimates presented in this report were produced using the NPSAS:2000 undergraduate Data Analysis Systems (DAS). The DAS software makes it possible for users to specify and generate their own tables. With the DAS, users can replicate or expand upon the tables presented in this report. In addition to the table estimates, the DAS calculates proper standard errors[13] and weighted sample sizes for these estimates. For example, table B1 contains standard errors that correspond to table 1, generated by the DAS. If the number of valid cases is too small to produce a reliable estimate (less than 30 cases), the DAS prints the message "low-N" instead of the estimate.

In addition to tables, the DAS will also produce a correlation matrix of selected variables to be used for linear regression models. Included in the output with the correlation matrix are the design effects (DEFTs) for each variable in the matrix. Since statistical procedures generally compute regression coefficients based on simple random sample assumptions, the standard errors must be adjusted with the design effects to take into account the stratified sampling method used in the NPSAS surveys.

For more information about the NPSAS:2000 and other Data Analysis Systems, consult the NCES DAS Web site **(*nces.ed.gov/das*)** or contact:

Aurora D'Amico
National Center for Education Statistics
1990 K Street, NW
Room 8115
Washington, DC 20006
(202) 502-7334
Internet address: Aurora.D'Amico@ed.gov

[13]The NPSAS:2000 samples are not simple random samples, and therefore, simple random sample techniques for estimating sampling error cannot be applied to these data. The DAS takes into account the complexity of the sampling procedures and calculates standard errors appropriate for such samples. The method for computing sampling errors used by the DAS involves approximating the estimator by the linear terms of a Taylor series expansion. The procedure is typically referred to as the Taylor series method.

Table B1.—Standard errors for table 1: Percentage of 1999–2000 undergraduate students who participated in distance education, and of those, the percentage whose entire program was taught through distance education, by student characteristics

	Total	Entire program taught through distance education
Total	0.28	1.17
Gender		
Male	0.35	1.94
Female	0.37	1.48
Race/ethnicity*		
White, non-Hispanic	0.33	1.42
Black, non-Hispanic	0.66	3.69
Hispanic	0.69	4.60
Asian	1.01	6.05
American Indian/Alaska Native	2.65	(#)
Pacific Islander/Native Hawaiian	2.28	(#)
Other	1.18	(#)
Primary language		
English	0.30	1.26
Other	0.61	3.96
Age		
Under 24	0.26	1.82
24 and over	0.50	1.57
Disability status		
Disability reported	0.69	3.18
No disability reported	0.29	1.25

#Too small to report.

*Following the Census 2000 model, NPSAS respondents were given the option of choosing more than one race. Those who chose more than one race were then asked: For historical purposes, could you please identify which single race best describes you? Priority was given to Hispanic/Latino regardless of race, and then to the response of those who chose more than one race to the "historical" choice question.

NOTE: Includes students who participated either only at the institution where they were primarily enrolled or both at the institution where they were primarily enrolled and somewhere else. Students who participated in distance education only at an institution other than the one where they were primarily enrolled were excluded.

SOURCE: U.S. Department of Education, National Center for Education Statistics, 1999–2000 National Postsecondary Student Aid Study (NPSAS:2000).

Statistical Procedures

Differences Between Means

The descriptive comparisons were tested in this report using Student's *t* statistic. Differences between estimates are tested against the probability of a Type I error,[14] or significance level. The significance levels were determined by calculating the Student's *t* values for the differences between each pair of means or proportions and comparing these with published tables of significance levels for two-tailed hypothesis testing.

Student's *t* values may be computed to test the difference between estimates with the following formula:

$$t = \frac{E_1 - E_2}{\sqrt{se_1^2 + se_2^2}} \tag{1}$$

where E_1 and E_2 are the estimates to be compared and se_1 and se_2 are their corresponding standard errors. This formula is valid only for independent estimates. When estimates are not independent, a covariance term must be added to the formula:

$$t = \frac{E_1 - E_2}{\sqrt{se_1^2 + se_2^2 - 2(r)se_1\, se_2}} \tag{2}$$

where *r* is the correlation between the two estimates.[15] This formula is used when comparing two percentages from a distribution that adds to 100. If the comparison is between the mean of a subgroup and the mean of the total group, the following formula is used:

$$t = \frac{E_{sub} - E_{tot}}{\sqrt{se_{sub}^2 + se_{tot}^2 - 2p\ \ se_{sub}^2}} \tag{3}$$

where *p* is the proportion of the total group contained in the subgroup.[16] The estimates, standard errors, and correlations can all be obtained from the DAS.

[14]A Type I error occurs when one concludes that a difference observed in a sample reflects a true difference in the population from which the sample was drawn, when no such difference is present.
[15]U.S. Department of Education, National Center for Education Statistics, *A Note from the Chief Statistician*, no. 2, 1993.
[16]Ibid.

There are hazards in reporting statistical tests for each comparison. First, comparisons based on large *t* statistics may appear to merit special attention. This can be misleading since the magnitude of the *t* statistic is related not only to the observed differences in means or percentages but also to the number of respondents in the specific categories used for comparison. Hence, a small difference compared across a large number of respondents would produce a large *t* statistic.

A second hazard in reporting statistical tests for each comparison occurs when making multiple comparisons among categories of an independent variable. For example, when making paired comparisons among different levels of income, the probability of a Type I error for these comparisons taken as a group is larger than the probability for a single comparison. When more than one difference between groups of related characteristics or "families" are tested for statistical significance, one must apply a standard that assures a level of significance for all of those comparisons taken together.

Comparisons were made in this report only when $p \leq .05/k$ for a particular pairwise comparison, where that comparison was one of *k* tests within a family. This guarantees both that the individual comparison would have $p \leq .05$ and that for *k* comparisons within a family of possible comparisons, the significance level for all the comparisons will sum to $p \leq .05$.[17]

For example, in a comparison of the percentages of males and females who participated in distance education, only one comparison is possible (males versus females). In this family, $k=1$, and the comparison can be evaluated without adjusting the significance level. When respondents are divided into four degree program categories and all possible comparisons are made, then $k=6$, and the significance level of each test must be $p \leq .05/10$, or $p \leq .005$. The formula for calculating family size (*k*) is as follows:

$$k = \frac{j(j-1)}{2} \tag{4}$$

where *j* is the number of categories for the variable being tested. In the case of race/ethnicity, there are degree program groups (No degree, Certificate, Associate's, Bachelor's), so substituting 4 for *j* in equation 4,

$$k = \frac{4(4-1)}{2} = 6$$

[17]The standard that $p \leq .05/k$ for each comparison is more stringent than the criterion that the significance level of the comparisons should sum to $p \leq .05$. For tables showing the *t* statistic required to ensure that $p \leq .05/k$ for a particular family size and degrees of freedom, see Olive Jean Dunn, "Multiple Comparisons Among Means," *Journal of the American Statistical Association* 56 (1961): 52–64.

Adjustment of Means to Control for Background Variation

Many of the independent variables included in the analyses in this report are related, and to some extent the pattern of differences found in the descriptive analyses reflect this covariation. For example, when examining rates of participation in distance education by gender, it is possible that some of the observed relationship is due to differences in other factors related to gender, such as number of dependents, institution type, and so on. However, if nested tables were used to isolate the influence of these other factors, cell sizes would become too small to identify the significant differences in patterns. When the sample size becomes too small to support controls for another level of variation, other methods must be used to take such variation into account. The method used in this report estimates adjusted means with regression models, an approach sometimes referred to as communality analysis.

For the analysis of distance education participation, multiple linear regression was used to obtain means that were adjusted for covariation among a list of control variables.[18] Each independent variable is divided into several discrete categories. To find an estimated mean value on the dependent variable for each category of an independent variable, while adjusting for its covariation with other independent variables in the equation, substitute the following in the equation: (1) a one in the category's term in the equation, (2) zeroes for the other categories of this variable, and (3) the mean proportions for all other independent variables. This procedure holds the impact of all remaining independent variables constant, and differences between adjusted means of categories of an independent variable represent hypothetical groups that are balanced or proportionately equal on all other characteristics included in the model as independent variables.

For example, consider a hypothetical case in which two variables, age and gender, are used to describe an outcome, *Y* (such as participation in distance education). The variables age and gender are recoded into a dummy variable representing age, *A*, and a dummy variable representing gender, *G*:

Age	*A*
Less than 24 years old	1
24 years or older	0

[18]For more information about least squares regression, see Michael S. Lewis-Beck, *Applied Regression: An Introduction*, Vol. 22 (Beverly Hills, CA: Sage Publications, Inc., 1980); William D. Berry and Stanley Feldman, *Multiple Regression in Practice*, Vol. 50 (Beverly Hills, CA: Sage Publications, Inc., 1987).

and

Gender	*G*
Female	1
Male	0

The following regression equation is then estimated from the correlation matrix output from the DAS as input data for standard regression procedures:

$$\hat{Y} = \mathrm{a} + \mathrm{b}_1 A + \mathrm{b}_2 G \tag{5}$$

To estimate the adjusted mean for any subgroup evaluated at the mean of all other variables, one substitutes the appropriate values for that subgroup's dummy variables (1 or 0) and the mean for the dummy variable(s) representing all other subgroups. For example, suppose *Y* represents participation in distance education, which is being described by age (*A*) and gender (*G*), coded as shown above. Suppose the unadjusted mean values of these two variables are as follows:

Variable	Mean
A	0.355
G	0.411

Next, suppose the regression equation results are as follows:

$$\hat{Y} = 0.51 - 0.17A - 0.21G \tag{6}$$

To estimate the adjusted value for younger students, one substitutes the appropriate parameter estimates and variable values into equation 6.

Variable	Parameter	Value
a	0.51	—
A	-0.17	1.000
G	-0.21	0.411

This results in the following equation:

$$\hat{Y} = 0.51 - (0.17)(1) - (0.21)(0.411) = 0.254$$

In this case, the adjusted mean for younger students is 0.254 and represents the expected outcome for younger students who resemble the average student across the other variables (in this example, gender). In other words, the adjusted percentage of younger students participating in distance education classes, controlling for gender, is 25.4 percent (0.254 x 100 for conversion to a percentage).

It is relatively straightforward to produce a multivariate model using the DAS, since one of the DAS output options is a correlation matrix, computed using pairwise missing values. In regression analysis, there are several common approaches to the problem of missing data. The two simplest are pairwise deletion of missing data and listwise deletion of missing data. In pairwise deletion, each correlation is calculated using all of the cases for the two relevant variables. For example, suppose you have a regression analysis that uses variables X1, X2, and X3. The regression is based on the correlation matrix between X1, X2, and X3. In pairwise deletion, the correlation between X1 and X2 is based on the nonmissing cases for X1 and X2. Cases missing on either X1 or X2 would be excluded from the calculation of the correlation. In listwise deletion, the correlation between X1 and X2 would be based on the nonmissing values for X1, X2, and X3. That is, all of the cases with missing data on any of the three variables would be excluded from the analysis.

The correlation matrix can be used by most statistical software packages as the input data for least squares regression. That is the approach used for this report, with an additional adjustment to incorporate the complex sample design into the statistical significance tests of the parameter estimates (described below).[19]

Most statistical software packages assume simple random sampling when computing standard errors of parameter estimates. Because of the complex sampling design used for the NPSAS survey, this assumption is incorrect. A better approximation of their standard errors is to multiply each standard error by the design effect associated with the dependent variable (DEFT),[20] where the DEFT is the ratio of the true standard error to the standard error computed under the assumption of simple random sampling. It is calculated by the DAS and produced with the correlation matrix output.

[19]Although the DAS simplifies the process of making regression models, it also limits the range of models. Analysts who wish to estimate other types of models, such as logit models, can apply for a restricted data license from NCES.

[20]The adjustment procedure and its limitations are described in C.J. Skinner, D. Holt, and T.M.F. Smith, eds., *Analysis of Complex Surveys* (New York: John Wiley & Sons, 1989).