

# Education and the Nontraditional Student

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In conducting the research for this project, we interviewed and surveyed three populations of students and former students: 139 current students at 20 area colleges and universities, 185 alumni from 16 area colleges and universities who responded to a survey, and 115 employees who had bachelor's degrees and worked in IT/CS at 74 area businesses, nonprofits, educational institutions, and government agencies. This chapter discusses the results of the student and faculty interviews and the alumni survey. Some analysis of the employee interviews is also included. An overarching finding is that, while there are some differences between nontraditional and traditional students, they are not so different in most areas. This suggests that including nontraditional students in programs at traditional institutions is not only feasible, but also in some cases desirable, given the added value of having a mix of students in the classroom with different experiences.

Some of the major highlights from our analysis include the following:

- Nontraditional students at nonprofit colleges and universities tend to be Caucasian males, although in our sample, there were a significant number of African Americans represented. Given that 5 of our 20 participating schools were HBCUs, this may indicate that HBCUs are playing a major role in educating nontraditional students.
- Nontraditional students especially, but IT/CS students in particular, are more likely to have attended multiple institutions before the institution that confers their IT/CS bachelor's degree and are likely to continue their education either by going to graduate school or taking training courses after they complete their degree. IT/CS students are therefore embracing lifelong learning, in recognition of the need to keep current in the IT/CS field.
- Both nontraditional and traditional IT/CS students like math and choose IT/CS because they are interested in the field. Professors may not think that students know what they are getting into when they choose to pursue a degree in IT/CS, but most students report that they do. While their primary reason for going into the field may be interest in IT/CS, secondary reasons often hinge on employment-related outcomes, such as higher salaries and opportunities for promotion. This is the same for both nontraditional and traditional students.
- Students, both nontraditional and traditional, generally choose a college or university based on location, cost, reputation, and program specifics. Institutions wishing to attract more nontraditional students will be most successful if they can build on one or more of these variables and if they can offer some kind of flexible scheduling of courses.
- Nontraditional students rely on diverse sources to finance their degrees, including federally funded financial aid, employer reimbursement, and some combination of loans, savings, and earnings from employment. In other words, nontraditional students tend to cobble together financing to pay for college. Traditional students, on the other hand, depend mostly on family resources with some loans and scholarships to finance their degrees. This means that nontraditional students are more vulnerable to changes in financial aid arrangements and are affected more by the loss of buying power than the lack of increase in financial aid has brought about.
- According to both professors and students, adequate preparation for an IT/CS degree should include more math, up to at least the precalculus level.

- Professors held generally positive views of nontraditional students, who are viewed as more focused and motivated to get a degree and lend positive work experience perspectives to the classroom. This contrasts with a more mixed view of female students and a decidedly negative opinion of underrepresented minorities. These views need to be addressed decisively before real diversity in the field might be achieved.
- Colleges and universities need to pay more attention to recruitment and retention and to targeting their efforts to various groups. Most professors do not engage in recruiting activities, and some programs indicate that they do no recruiting at all because they have more students than they can accommodate. However, achieving diversity requires special recruitment and retention efforts, regardless of the number of students already in the program. Those colleges and universities that are interested in enrolling more nontraditional students will need to evaluate carefully the messages they send and their impact on welcoming nontraditional students to their campus.
- To attract a more diverse pool of students, IT/CS departments need to spread the word about the breadth of the field and the actual work that IT/CS professionals do. Most important is to emphasize the problem-solving character of the field. We found very little evidence among those enrolled in IT/CS programs that IT/CS is battling a “nerd stereotype” that makes it less attractive to women and minorities.
- Finally, students and faculty both seem to understand the importance of internships or external work experiences on the future success of IT/CS students. Both nontraditional and traditional students say they would like to have internship experiences, and dissatisfaction with their IT/CS program often involves a perceived lack of opportunity to complete an internship.

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## Demographics

The demographics of the student interviewees at the 20 area universities and colleges and the alumni who answered our survey from the 16 participating universities and colleges were remarkably similar. Of the students interviewed, 28 percent had one or more characteristics that qualified them as nontraditional, leaving 72 percent traditional students in our interviewee population. In the alumni survey, nearly 30 percent of respondents had one or more nontraditional characteristic when they were a student, similar to our interviewee demographics. The demographics of our employee interviewees were somewhat different from our other two student populations. Nearly 40 percent of our employee interviewees designated themselves as having been nontraditional students during the time they attended university or college in pursuit of their IT/CS degree. However, we were also able to calculate whether employees had been nontraditional students using the criteria listed above. Using our measures, almost 50 percent of employee interviewees had been nontraditional. Detailed analysis of the demographics of all these survey populations appears in Chapter 2.

## Comparing Traditional and Nontraditional Students

### Personal interests

The student interviews asked a number of open-ended questions aimed at exploring the differences between traditional and nontraditional students in terms of personal characteristics, attitudes, and experiences. When asked what their favorite subjects were in elementary and high school, both traditional and nontraditional students were equally likely to mention math and science classes, and over 75 percent of all respondents mentioned math. However, traditional students were much more likely to talk about computer classes as a favorite subject in high school. Traditional students were also more likely to list non-math/science courses as favorites, including English (33 percent versus 24 percent of nontraditional students), social studies (24 percent versus 9 percent), and dance/music/art (26 percent versus 18 percent) (see Appendix Table C.1).

When asked about pastimes, over one-third of all students listed sports or exercise as a major activity in their free time. Nontraditional students were less likely, however, to list surfing the Internet (7 percent versus 18 percent of traditional students) or playing video games (9 percent versus 17 percent) as major pastimes compared to their traditional counterparts. Nontraditional students also were less likely to mention socializing as something they did in their spare time, although they did indicate that spending time with family was important. For the most part, however, there were very few patterns in what students spent their non-studying, non-working hours doing (see Appendix Table C.2).

### Reasons for choosing IT/CS

Interest in computing was the overwhelming response to inquiries about why students chose to study IT/CS as a major—over 60 percent of both traditional and nontraditional student interviewees cited an interest in computing. For nontraditional student interviewees, the next major influences on their decision to pursue a degree in IT/CS were work experience in the field (27 percent), job opportunities (24 percent), and earning potential (13 percent). For traditional students, after interest in the field, they mentioned most often a K-12 classroom experience (22 percent), job opportunities (19 percent), and that IT/CS was just a “natural fit” for them (13 percent). Moreover, only traditional students expressed an interest in the field based on parental or family influence (11 percent) or their interest in computer games or animation (7 percent). This contrasts sharply with professors’ opinions (elaborated on below) of students’ motivations for entering the field. Many professors believe that students choose IT/CS because they think they can make a lot of money or have better job prospects rather than any true interest in the field. This rather negative perspective may lead professors to have a more jaded perception of students, especially those students less likely to choose the field in the first place, such as women and minorities (see Appendix Table C.3).

Similar results were found in the alumni survey responses to a list of possible influences on their decisions to choose a career/degree in IT/CS (see Chart 3.1 and Appendix Table C.4). Respondents were asked to choose the most important influence

on their choice from a list that included opportunities for promotion/advancement, salary potential, personal interest, family/parental influence, friend/peer influence, or other. A total of 64 percent of respondents who had been traditional students and 57 percent of those who had been nontraditional students selected personal interest in the field as the most important reason for choosing IT/CS. For nontraditional students, the next top reason was opportunities for promotion/advancement (20 percent) and then salary potential (18 percent). For traditional students, salary potential was the next most frequently chosen reason for choosing IT/CS (24 percent).

### Reasons for choosing institutions

Student interviewees, both traditional and nontraditional, overwhelmingly choose their institutions based on location. However, location can mean many things. For traditional students, it means getting away from parents or staying close to family, choosing an urban environment, or leaving the city. In other words, traditional students were more likely to see location as a choice. For nontraditional students, on the other hand, having a campus close to work or home was essential, and location was often combined with convenience as a reason for choosing an institution, making location more of a constraint than a choice (see Appendix Table C.5).

The next most important concern for student interviewees in choosing an institution is cost, but for nontraditional students, this was on an equal footing with the reputation of the institution. An institution's reputation was much more important

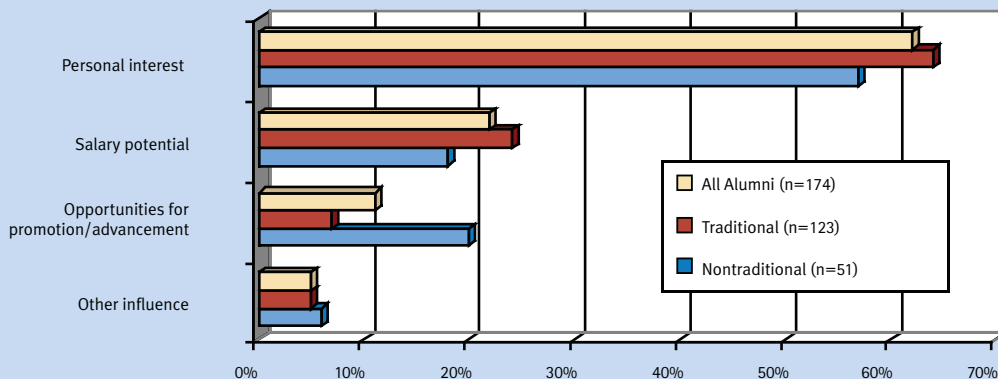
to nontraditional student interviewees than it was for traditional students. Traditional students, however, were more interested in program characteristics than nontraditional students.

After these four concerns (location, cost, program characteristics, and reputation of the institution), other influences on traditional and nontraditional students and selection of their institutions reflect a divide noted in Chapter 1. Traditional students were significantly more interested in campus life/atmosphere (27 percent mentioned this versus only 9 percent of nontraditional students), whereas only nontraditional students indicated that having weekend or night classes was a concern in their choice. Nontraditional students were also more likely to mention a small faculty/student ratio, and only nontraditional students indicated that they wanted to complete their degree quickly.

We probed students more directly about the importance of campus culture. Of traditional students, 66 percent said that campus culture was indeed important to them compared to only 27 percent of nontraditional students. Traditional students mentioned most often the size of the school, along with a comfortable atmosphere, diversity of student population, and personal attention from faculty and staff. A few nontraditional students directly indicated that a physical campus was not important to them at all, whereas 8 percent of traditional students specifically stated that a physical campus was essential.

Nontraditional students were also more likely to seek students who were like themselves in the insti-

**CHART 3.1** Why Alumni Chose to Pursue an IT/CS Degree



tution; 9 percent of nontraditional students said that the presence of older students was an important part of campus culture (see Appendix Table C.6).

In the alumni survey, respondents were asked to indicate the importance of 10 variables on their choice of academic institution based on a five-point scale ranging from “extremely important” to “not at all important.” Alumni who had been nontraditional students ranked the geographic location of the campus as the most important reason for choosing the institution where they earned their IT/CS degree, followed by convenience of commute, the flexibility of course offerings, cost, and the reputation of the institution/program/professors. This was markedly different from traditional students whose most important concern was the reputation of the institution/program/professors followed by geographic location, cost, flexibility of course offerings, size and/or culture of the institution, and, finally, the convenience of the commute.

More than one in three nontraditional alumni indicated that their employer’s tuition reimbursement program had been an important factor in their decision. Nontraditional alumni were also more likely to indicate that online courses were at least somewhat important, but online courses were not a major factor for any of the alumni, with nearly 57 percent of all alumni saying they were not very or not at all important and nearly 30 percent seeing them as not even applicable to their situation. The presence of women and minorities on a campus and having a relative or friend attend a particular institution were secondary concerns or not at all important for most alumni (see Appendix Table C.7).

Among the employee interviewees, location was again the top influence on their choice of institution, but it was much more important for employees who had been nontraditional students than for those who had been traditional students (61 percent versus 43 percent). Employees who had been traditional students were no more likely to mention the strong reputation of a program or institution over location. Finally, traditional student employees were much more likely to have had a family member or a friend connected with an educational institution and to mention the educational environment/atmosphere as being important factors in their choice of institution (see Appendix Table C.8).

Our results show that nontraditional and traditional students are making different calculations in selecting an academic institution. Nontraditional students value convenience and flexibility more than their traditional counterparts. Traditional students, on the other hand, seem more attracted to campus culture and program characteristics. They are not as far apart, however, as some make them seem. Although our data show a different ranking of importance on certain variables, both types of students put a premium on location, cost, and reputation, and while they might mention or rank other variables as important, these are generally secondary factors in their choice.

### Educational experiences

Most of our students, both nontraditional and traditional, in our student interview population majored in computer science. This was not true of our alumni survey respondents, however. The majority of the alumni, both traditional and nontraditional students, had majored in computer information systems (CIS), business information systems (BIS), and other technology-related majors. The number of computer science majors in our interviewee pool is reflective simply of the number of computer science departments that agreed to participate in this study. Table 3.1 shows the breakdown of majors for the student interviewees, and Table 3.2 shows the breakdown for the alumni survey.

Within our student interviewee population, traditional and nontraditional students were equally as likely to have a double major (although few students did) or to have a minor. The most popular double majors were math and business, and the minors most often chosen were math and CS/IS/CIS in some form depending on their major. Some computer science majors, for example, had a

**TABLE 3.1** Student Interview Data: “What is your major?”

	Nontraditional (n=45)	Traditional (n=93)	All Students (n=138)
Computer science	71% (32)	61% (57)	64% (89)
CIS/BIS/other technology-related major	24% (11)	37% (34)	33% (45)
Computer engineering	2% (1)	1% (1)	1% (2)
Other	2% (1)	1% (1)	1% (2)

minor in computer and information sciences, or visa versa (see Appendix Table C.9).

Our student interviewees—nontraditional and traditional students—were equally likely to have switched into IT/CS from another major; about 20 percent had, which is a considerable amount for both traditional and nontraditional students and underscores the importance of recruiting efforts within introductory computer science courses (Table 3.3). Almost 10 percent of both traditional and nontraditional students indicated that they chose their IT/CS major because of an experience they had in a college course (refer again to Appendix Table C.3, “Other responses”).

When asked if they had contemplated switching out of their IT/CS major, traditional students were more likely to say that they have (20 percent versus 11 percent). By gender, however, women were significantly more likely to say that they had contemplated switching out of their IT/CS major (25 percent versus 11 percent). This indicates that retention efforts are still necessary for females in IT/CS majors, although nontraditional students might not need special targeting.

The majority of both nontraditional and traditional students felt adequately prepared to begin a degree in IT/CS, although nontraditional students felt somewhat less prepared than their traditional counterparts (Table 3.4). Only 52 percent of nontraditional students felt adequately prepared, whereas 66 percent of traditional students felt that way. When asked to compare themselves to others in their program, nontraditional students were significantly more likely to say that their preparation was worse, whereas traditional students were much more likely to see their preparation as being the same or better than that of their peers.

By gender, although more than 50 percent of women said they were adequately prepared to begin their programs, they were significantly more likely to say they had not been adequately prepared compared to the men (Table 3.5). Men were significantly more likely to see themselves as better prepared than their classmates, whereas women generally thought they were equally prepared as other students in their program.

When asked what other preparation they would have wanted, students, both traditional and nontraditional, were most likely to mention math and computer programming classes. Interestingly, non-

**TABLE 3.2** Alumni Survey Responses: “What was your major?”

	Nontraditional (n=52)	Traditional (n=123)	All Alumni (n=175)
Computer science	40% (21)	45% (55)	43% (76)
CIS/BIS/other technology-related major	56% (29)	54% (66)	54% (95)
Computer engineering	4% (2)	2% (2)	2% (4)

**TABLE 3.3** Student Interview Data:

“Have you changed majors into IT/CS from another major?”

	Nontraditional (n=45)	Traditional (n=93)	All Students (n=138)
Yes	20% (9)	22% (20)	21% (29)
No	80% (36)	79% (73)	79% (109)

“Have you contemplated changing your IT/CS major?”

	Nontraditional (n=45)	Traditional (n=93)	All Students (n=138)
Yes	11% (5)	20% (19)	17% (24)
No	89% (40)	80% (74)	83% (114)

	Female (n=34)	Male (n=71)	All Students (n=112)
Yes	25% (17)	11% (8)	17% (24)
No	76% (17)	89% (63)	83% (114)

**TABLE 3.4** Student Interview Data:

“Did you feel you were adequately prepared before beginning your current degree program?”

	Nontraditional (n=44)	Traditional (n=89)	All Students (n=133)
Yes	52% (23)	66% (59)	62% (82)
No	48% (21)	34% (30)	38% (51)

“How prepared were you compared to other students in the program?”

	Nontraditional (n=36)	Traditional (n=76)	All Students (n=112)
Worse	44% (16)	21% (16)	29% (32)
Same	22% (8)	36% (27)	31% (35)
Better	33% (12)	43% (33)	40% (45)

traditional students were almost twice as likely to mention needing more math than traditional students (27 percent versus 16 percent) (see Appendix Table C.10).

We also asked students if their conceptions of the IT/CS field and of computer scientists or computer professionals had changed since they began their programs. Regarding the field, about 25 percent of both traditional and nontraditional students said that they had the same conception now as when they had started. An equal number of nontraditional and traditional students said that they had a broader conception now than before they started. Nontraditional students were more likely to say that they had only had a vague conception of the field at first and that they had thought it would be easier than it is. More traditional students indicated that they now see the field as more than just programming and that it is more detail-oriented (see **Appendix Table C.11**).

When we asked students about computer professionals, our expectations had been that most students would talk about the “nerd” stereotype. Very few actually did, and most students talked more about the field or about the actual work of computer scientists than about stereotypes. While much of the literature points to the “nerd” stereotype as a problem for women in particular, our data suggest that this is less of a problem than getting the word out about what computer scientists actually do (see **Appendix Table C.12**).

When asked about courses they found particularly difficult, nontraditional students were about twice as likely as traditional students to say that they had not encountered any difficult classes. Of those who found some courses to be extraordinarily difficult, most mentioned programming and math. Traditional students were more likely to indicate that operating systems and software design were difficult. Of those who found some courses to be difficult, traditional students were more likely than nontraditional students to identify “weed out” courses—in other words, courses that were intentionally made difficult to get some students to drop out of the program. Most students, however, did not cite these courses as a cause for dropping the program (see **Appendix Table C.13**).

In comparing their abilities to do the coursework, almost half of all nontraditional students and 42 percent of traditional students saw themselves as the same as other students or average (**Table 3.6**). More traditional students said that they were better than their colleagues, and nontraditional students were slightly more likely to say that they were much

**TABLE 3.5** Student Interview Data:

*“Did you feel you were adequately prepared before beginning your current degree program?”*

	Female (n=66)	Male (n=68)	All Students (n=134)
Yes	55% (36)	68% (46)	62% (82)
No	46% (30)	32% (22)	39% (52)

*“How prepared were you compared to other students in the program?”*

	Female (n=54)	Male (n=59)	All Students (n=113)
Worse	24% (13)	32% (19)	28% (32)
Same	46% (25)	19% (11)	32% (36)
Better	30% (16)	49% (29)	40% (45)

worse, although very few students saw themselves as doing worse than their fellow students. By gender, women were much more likely to say that their abilities to do the coursework in the program are the same or average, while the men saw themselves as doing somewhat or much better.

Almost all students we interviewed were comfortable or very comfortable in their program or department. Only traditional students indicated some level of discomfort. A majority of students felt that all students are treated the same in the department; although, among those asked a follow-up question, traditional students were much more likely to answer that they feel part of a group than nontraditional students (see **Appendix Table C.14**).

The vast majority of students felt that they had the same access to campus resources as the other students in their degree program, although nontraditional students were more likely to see a discrepancy in resource distribution. When asked to elaborate on the resources they were lacking, nontraditional students listed lab and computer access and financial aid as most problematic. Very few traditional students saw lab or computer access as a problem. When queried about whether they had any difficulties in getting the classes they needed to complete their degrees, nontraditional students were almost twice as likely to say that they have had difficulties compared to traditional students. Difficulties were primarily scheduling, especially when key courses were offered at the same time.

Nontraditional and traditional students also complained that courses were not offered enough, that they were often full, or that they were not offered at convenient times. Only 4 percent of nontraditional students and no traditional students found it hard to transfer credits from other institutions (see **Appendix Table C.15**).

Almost 70 percent of nontraditional students said that they never miss class or rarely miss class, compared with 46 percent of traditional students. Sickness, family responsibilities, commitments to other classes, and work or business topped off the list of reasons that nontraditional students might have for missing class. Traditional students, on the other hand, pointed mostly to sickness and commitments to other classes, but also found that attending some classes was unnecessary or boring or that they were too tired and needed more sleep. Overall, traditional students had many more reasons for missing class than nontraditional students. There were no differences in how students make up the work that they might miss. Most relied on friends in the class or the professor to find out what they missed (see **Appendix Table C.16**).

Nontraditional students in our interview population were much more likely to have attended night or weekend classes or to have taken an online course, although 39 percent of traditional students had also taken a night course. When asked about their experiences in these “alternative” classes, most students pointed to older/mature students in the class as a positive aspect. Alumni who had been nontraditional students were almost twice as likely to have attended a night class and almost five times more likely to have taken a weekend course than their traditional student alumni counterparts. Interestingly, alumni who had been traditional students were more likely to have taken an online course than nontraditional alumni (see **Appendix Tables C.17 and C.18**).

Traditional students were much more likely to have had a research experience with faculty or other students outside of the classroom. It was also more probable that traditional students were planning on doing or already have done an internship or co-op job before they graduate. Most nontraditional students who were not planning on doing an internship indicated that they would like to do so (see **Appendix Table C.19**).

One-third of traditional students indicated that

**TABLE 3.6** Student Interview Data:

*“How would you describe your abilities to do your coursework in comparison to the other students in your program?”*

	Nontraditional (n=45)	Traditional (n=93)	All Students (n=138)
Much worse	4% (2)	1% (1)	2% (3)
Somewhat worse	2% (1)	3% (3)	3% (4)
Same/average	47% (21)	42% (39)	43% (60)
Somewhat better	24% (11)	32% (30)	30% (41)
Much better	11% (5)	9% (8)	9% (13)
Don't/unable to compare	7% (3)	2% (2)	4% (5)
Depends on class	0%	6% (6)	4% (6)
NA	4% (2)	4% (4)	4% (6)

	Female (n=68)	Male (n=71)	All Students (n=139)
Much worse	0% (0)	4% (3)	2% (3)
Somewhat worse	4% (3)	1% (1)	3% (4)
Same/average	54% (37)	32% (23)	43% (60)
Somewhat better	22% (15)	38% (27)	30% (42)
Much better	6% (4)	13% (9)	9% (13)
Don't/unable to compare	4% (3)	3% (2)	4% (5)
Depends on class	4% (3)	4% (3)	4% (6)
NA	4% (3)	4% (3)	4% (6)

they saw their professors one or more times per week. In contrast, nearly 40 percent of nontraditional students saw professors at most one or more times per semester or rarely. Not surprisingly, more traditional students felt that they had a mentor (as opposed to just an advisor) (see **Appendix Table C.20**).

Finally, both nontraditional and traditional students were equally likely to say that they had contemplated leaving college in the past year, although only 24 percent of all students said that they had contemplated doing so (**Table 3.7**). Nontraditional students most often indicated that they had personal or family reasons for possibly leaving their education followed by the fact that there was too long a time commitment involved in getting a bachelor’s degree. Traditional students were more likely to say they contemplated leaving for financial reasons or because they had gotten a job offer.

### Satisfaction

Most student interviewees indicated that they were satisfied with their choice of major and with their institution. However, when asked to reassess their

college decisions, 13 percent of students indicated they would not have chosen the same major and 27 percent would not have chosen the same institution. There were not many patterns discernable between traditional and nontraditional students. One exception was traditional students' satisfaction with their institution. Of traditional students, 84 percent indicated that they were satisfied with their institution, but only 44 percent said that they would choose it again; 10 percent said that they might choose it again. When asked if they would recommend the institution to a friend, 69 percent said yes, 11 percent said maybe, and only 3 percent said no. Similar patterns were found among nontraditional students to these questions, but the differences were not quite so stark (see Appendix Table C.21).

We asked a series of questions in our alumni survey exploring satisfaction with one's IT/CS bachelor's degree program on a number of different variables. Respondents were asked to rate how satisfied they were on a five-point scale ranging from extremely satisfied to very dissatisfied. Results of these broken down by traditional and nontraditional status are presented in Appendix Table C.22. There were very few differences between nontraditional and traditional alumni in terms of satisfaction with their IT/CS bachelor's program. Most alumni were very to extremely satisfied on most variables, and dissatisfaction was minimal. There are a few exceptions, however. Nontraditional alumni were less satisfied with career mentoring than their traditional counterparts, although 21 percent of nontraditional alumni did not see career mentoring as even applicable to their situation (compared to only 2 percent of traditional students). Interestingly, nontraditional alumni were more likely to be extremely to very satisfied with their working relationships with their professors than traditional alumni, 16 percent of whom were somewhat to very dissatisfied (compared to only 6 percent of nontraditional alumni).

Mirroring the question above that dealt with internships, nontraditional alumni were much less satisfied with opportunities to participate in co-op and internship programs than their traditional colleagues. This indicates that nontraditional students are not averse to doing co-ops or internships and do value them as part of their educational experience.

**TABLE 3.7** Student Interview Data:

*“In the past year, have you contemplated leaving college for any reason?”*

	Nontraditional (n=45)	Traditional (n=93)	All Students (n=138)
Yes	27% (12)	23% (21)	24% (33)
No	73% (33)	77% (72)	76% (105)

*“What reasons specifically?”*

	Nontraditional (n=13)	Traditional (n=20)	All Students (n=33)
Personal/family reasons	62% (8)	20% (4)	36% (12)
Economic/money reasons	15% (2)	30% (6)	24% (8)
Job offers/opportunities	15% (2)	25% (5)	21% (7)
Too long a time commitment	23% (3)	5% (1)	12% (4)
Program/department limitations	0%	15% (3)	9% (3)
Health reasons	15% (2)	5% (1)	9% (3)
Travel	8% (1)	5% (1)	6% (2)
Problems with faculty	0%	5% (1)	3% (1)
Job commitments	0%	5% (1)	3% (1)

### Financing

Within our student interview population, 73 percent of nontraditional students reported that they received financial aid, whereas 62 percent of traditional students did so. Among those who did receive financial aid, approximately half said that the aid has been adequate or somewhat adequate, with very little difference between traditional and nontraditional students. However, nontraditional students were over twice as likely as traditional students to say that they would not have attended college without financial aid.

The kind of financial aid that traditional and nontraditional students received differed markedly. While both relied on Stafford and Parent Loan for Undergraduate Student (PLUS) loans, nontraditional students within our sample were almost twice as likely to be receiving a Pell Grant. Nontraditional students were also significantly more likely to be on the Montgomery GI Bill or to receive employer tuition assistance or reimbursement. Traditional students, on the other hand, relied more on family assistance and scholarships to pay for college (see Appendix Table C.23).

These findings are mirrored in our alumni survey (Table 3.8). For traditional students, financial support from their families was the number

one financing option (51 percent) followed by loans from banks, schools, or the government (34 percent); finally, tuition waivers, grants, and scholarships were a distant third option (6 percent). Nontraditional students relied on a number of different kinds of financing: savings (40 percent), loans (38 percent), financial assistance/reimbursement from employers (24 percent), and earnings from employment (18 percent).

Clearly, nontraditional students rely on a combination of different sources to finance their education, piecing together packages that might have more or less flexibility. They are, therefore, more susceptible to changes in financial aid award packages and to the declining purchasing power of the Pell Grant, which has not kept pace with inflation or rising tuition cost. Traditional students, on the other hand, largely rely on family and loans to see them through college and are thus less vulnerable than their nontraditional counterparts.

## Post-Graduation Educational Plans and Experiences

Both nontraditional and traditional students had remarkably similar plans when asked if they wanted to continue their education after completing their bachelor's degree. An astounding 77 percent of both nontraditional and traditional students said that they would continue their education either right away or in the future. About half of both populations sought at least a master's degree in an IT/CS field, whereas 18 percent indicated that they might want a business master's (see Appendix Table C.24).

Among our alumni survey respondents, traditional and nontraditional alumni showed comparable similarities (Table 3.9). Around one-quarter of both populations was pursuing a graduate degree in IT/CS, and over 40 percent were taking additional training courses. Among the employees that we interviewed, 74 percent indicated that they had plans to go back to school. This reinforces our earlier observation about the penchant for lifelong learning among students in the IT/CS field, where the half-life of skills is getting shorter and shorter. These students, no matter what their circumstances, seem up to the challenge.

**TABLE 3.8** Alumni Survey responses:

*“What was your main source of financing for your IT/CS degree?”  
(Please choose only one.)*

	Nontraditional (n=50)	Traditional (n=123)	All (n=173)
Financial support from parents/partners/ other relatives not to be repaid	6% (3)	51% (63)	38% (66)
Loans from the school you attended, banks, federal/state government	38% (19)	34% (42)	35% (61)
Loans from parents or other relatives that must be repaid	2% (1)	3% (4)	3% (5)
Financial assistance or reimbursement from your employer	24% (12)	1% (1)	8% (13)
Tuition waivers, fellowships, grants, scholarships	6% (3)	6% (7)	6% (10)
Earnings from employment	18% (9)	2% (3)	7% (12)
Savings	4% (2)	1% (1)	2% (3)
Other	2% (1)	2% (2)	2% (3)

**TABLE 3.9** Alumni Survey Responses:

*“Since completing your IT/CS bachelor's degree, are you pursuing any additional formal education?”*

	Nontraditional	Traditional	All
Certificate program in IT/CS	21% (10) (n=47)	19% (22) (n=118)	19% (32) (n=165)
Additional training courses in IT/CS	44% (21) (n=48)	41% (49) (n=120)	42% (70) (n=168)
Graduate degree in an IT/CS field	24% (11) (n=46)	18% (21) (n=119)	24% (40) (n=165)
Graduate degree in a non-IT/CS field	11% (5) (n=45)	12% (14) (n=119)	12% (19) (n=164)
Other	10% (4) (n=40)	8% (8) (n=99)	9% (12) (n=139)

## Teaching the Nontraditional Student

In our interviews with professors, we asked many questions aimed at ascertaining both what professors wanted students to learn as well as their attitudes and experiences with different groups of students. We compare their answers below with the student responses wherever possible. Detailed analysis of the demographics of this group appears in Chapter 2.

## Perceptions of the field

We began each interview by asking what each interviewee considered to be the defining characteristic of an IT/CS education. Nearly 30 percent cited “problem-solving” as their primary view of what IT/CS entailed. Twenty-five percent saw their mission as preparing students for a career in the field, and another 24 percent wanted students to understand the fundamentals of computing. When asked about the core courses that should be included in an IT/CS program, answers ranged from just a few courses to whole IT/CS curricula. A few basic core courses could be teased from the answers: 90 percent mentioned a series of programming courses, followed by data structures (46 percent), systems analysis/design/software engineering (44 percent), and a database course (39 percent). Other courses are listed in **Appendix Table C.25**.

We then asked each professor if he or she felt that students had the same concept of IT/CS as he or she had (**Table 3.10**). Two of three said that students did not see IT/CS the same way. When queried about students’ perceptions, professors complained that students saw IT/CS as just a way to a good job, as only programming, or that they did not see the big picture. Forty-three percent of professors saw this difference in perception as problematic. This contrasts with 25 percent of all students and 31 percent of nontraditional students who indicated that their perceptions of the field had not changed since beginning their IT/CS degree, as indicated in **Appendix Table C.11**. An additional 32 percent indicated that they had either only a vague view at first or now had a broader conception. This indicates that the majority of students may have either already “got it” or were getting it as they progressed through the program. Professors’ perceptions of problems with students not seeing IT/CS the same way as they do might be unfounded or at least not as problematic as they might think.

When asked about important prerequisites, 65 percent indicated that they would like to see students with precalculus math courses (**see Appendix Table C.26 and Chart 3.2**). This seems to correspond with students’ own idea that they wished they had more math in preparation for their degree program (**see Appendix Table C.10**). While 18 percent of professors would like to see students with at least some introduction to computers, they were also likely to list non-computer/math-based prerequisites as

**TABLE 3.10** Faculty Interview Student Conceptions:

*“Do incoming undergraduates generally see IT/CS in the same terms as your concept?”*

	Percentage (n=72)
Yes	19% (14)
No	67% (48)
Unsure/don’t know	10% (7)
NA	4% (3)

*“How do their perceptions differ?”*

	Percentage (n=53)
Way to a good job	23% (12)
Programming only	23% (12)
Don’t see the big picture	21% (11)
Related to computer games/entertainment	15% (8)
Way to make money	13% (7)
Not much math involved	13% (7)
Related to computers only	9% (5)
Internet/websites	9% (5)
Tools only	4% (2)
Don’t need to learn programming	2% (1)

*“Is that a problem?”*

	Percentage (n=54)
Yes, problematic	57% (31)
No, not problematic	43% (23)

well, including discipline or work ethic, logic or critical thinking skills, an inquisitive nature and open mind, and English or communication skills.

We also inquired about the skills that professors hoped to impart to their students (**see Appendix Table C.27 and Chart 3.3**). Again, problem-solving was number one, with almost 40 percent mentioning it. The second most popular answer was the ability to learn or readiness for lifelong learning. As evidenced above by the students’ and alumni’s ambitions for further education, this notion of lifelong learning is being passed along. Whereas 31 percent of professors wanted their students to gain at least a measure of technological literacy, professors were as likely to mention nontechnical skills among those they hoped to impart to their students, including creative thinking, communication and interpersonal skills, teamwork, discipline, and a good attitude toward work.

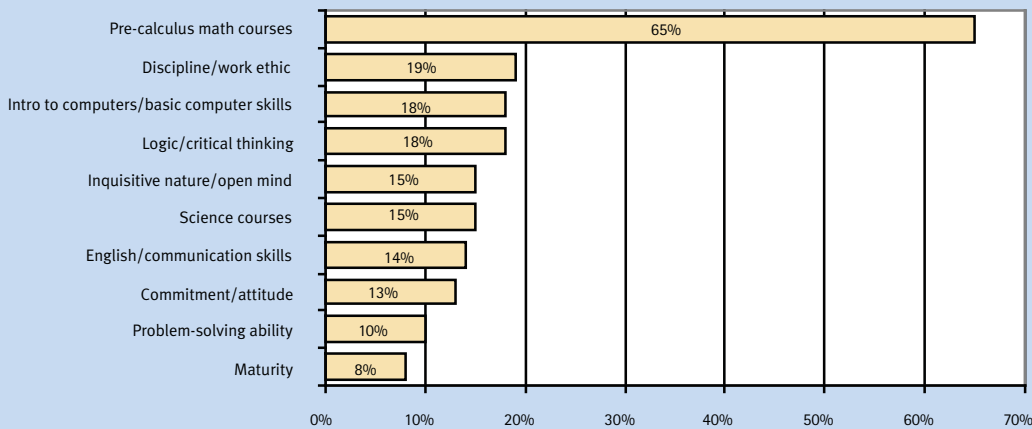
### Perceptions about students

Professors were asked directly if they perceived any differences between nontraditional and traditional students. The differences most often cited were overwhelmingly positive, including more mature, confident, serious, committed, and enthusiastic. In addition, nontraditional students were viewed as having more experience, preparation, and better skills. In other words, nontraditional students were perceived to have most of the necessary prerequisites that professors identified as being essential for

success in an IT/CS program. Negative responses to this question focused on nontraditional students having more outside commitments and being somewhat less confident in the beginning. About 8 percent of professors said they saw no differences between traditional and nontraditional students, and 6 percent said that they had no or only limited experience with nontraditional students.

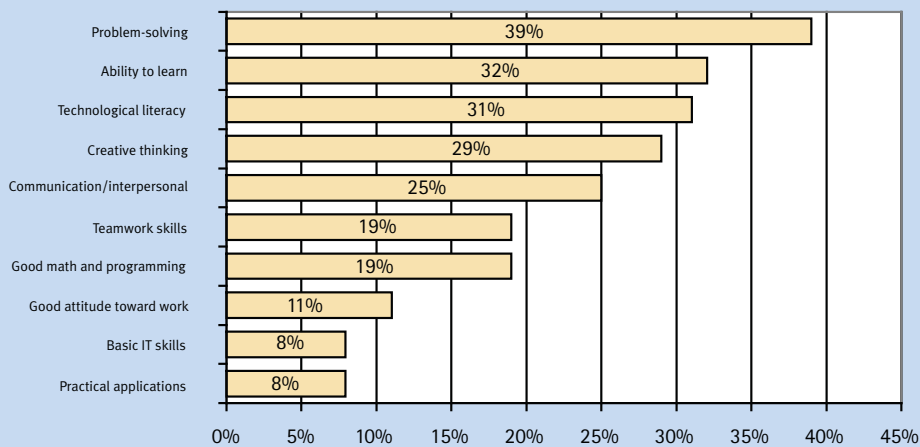
In contrast, we also asked professors if they perceived any differences between their male and female students. Forty-two percent said that they

**CHART 3.2** Top 10 Prerequisites for Students to Begin IT Coursework According to Faculty



Note: Faculty could indicate more than one answer, so total > 100%.

**CHART 3.3** Top 10 Necessary Skills Faculty Hope to Impart to Their Students



Note: Faculty could indicate more than one answer, so total > 100%.

saw no differences at all between them. Some listed positive differences, including that women were more disciplined and focused, smarter, more serious, more mature, and overall just better. But we also had a number of more negative responses in which women were perceived as being less confident than their male counterparts, more likely to drop out, less adventurous, and less likely to enjoy programming or computer science.

When asked about underrepresented minorities, more professors were unwilling to answer this question, and about 13 percent said that they simply did not have any or enough experience with these students. Another 26 percent said that they saw no differences. Those willing to list differences had only negative observations of underrepresented minority students, including being less prepared, being more likely to struggle, having problems fitting in, and lacking communication skills (see **Appendix Table C.28**).

We were generally heartened by the positive ratings that nontraditional students received from those who teach them. Important to keep in mind, however, is the preponderance of Caucasian males among nontraditional students at these institutions. The mixed perceptions of women and the mostly negative perceptions of underrepresented minorities are troubling, however, and problematic from the standpoint of recruiting and retaining more of these students.

### Weed out courses

The concept of “weed out” courses—courses specifically designed to cull weaker students out of the program—is problematic. Often, those weeded out are disproportionately members of underrepresented groups, including women and minorities, but also nontraditional students. Questions elucidated above showed that nontraditional students and women were more likely to see themselves as average or worse than their classmates. Combine this with a culture that condones “weeding out,” and the potential exists for more women and nontraditional students dropping out of IT/CS. Almost 40 percent of professors said that their program has weed out courses. Another 33 percent said that they had courses that function as weed outs, although they are not specifically designed as such. When asked a follow-up question about students

that consistently do worse in these courses, 14 percent of professors did not perceive a pattern among students, whereas 11 percent identified nontraditional and weekend students as having difficulties with these courses.

Nearly half of the professors queried thought that students do perceive these courses as weed outs. However, when asked if they thought that this perception affected students’ ability to complete the coursework, most said that it did not or that it made them work harder. This is corroborated by students’ responses as outlined in **Appendix Table C.13**. Fifteen percent said that students either drop out of these courses or try to avoid them altogether, and another 15 percent said that it does affect students’ abilities to complete the coursework. Only 11 percent of professors said that they try to help students get through difficult courses or offer tutoring (see **Appendix Table C.29**).

### Recruitment efforts

Much of the literature on increasing the numbers of women and minorities, in particular, in IT/CS fields discusses the importance of recruitment efforts, especially of broadening the pool for student recruitment. (For a good summary of recruitment and retention efforts, see Janice Cuny and Bill Aspray, “Recruitment and Retention of Women Graduate Students in Computer Science and Engineering,” Report of a Workshop, June 20–21, 2000, Organized by the Computing Research Association’s Committee on the Status of Women in Computing Research, Computing Research Association, 2001.) Most professors, however, indicated that undergraduate recruitment activities were concentrated at the university level, with no recruiting done by their specific departments. About 10 percent said that no recruitment was necessary, mostly because they already had too many students in the program. When asked specifically about recruitment of nontraditional students, about 25 percent of respondents said that there is no recruitment of nontraditional students at their institution, 15 percent thought there were no differences in recruiting nontraditional and traditional students, and 11 percent indicated that nontraditional students were targeted with special literature.

A little over half of the professors we spoke with did engage in some recruiting activities. Most had

participated in open houses, career fairs, or campus tours. The second most mentioned recruiting activity involved visiting local high schools. However, only 6 percent said that they recruited at community colleges, a prime locale for recruiting nontraditional students. Additionally, only 3 percent indicated that they did recruiting in their introductory courses, even though a positive experience in an introductory course influenced students' decisions to pursue an IT/CS degree (see Appendix Table C.3). Finally, only 3 percent of professors had participated in special summer programs to attract minority students (see Appendix Table C.30).

### **Awareness of nontraditional students**

We wanted to ascertain professors' awareness of nontraditional students at their institutions and the problems they might face. When asked about the attractiveness of their institution to nontraditional students, 25 percent said that they offered night and weekend courses. Almost 20 percent correctly identified their location as being a prime reason for nontraditional students to choose their institution, 14 percent mentioned cost, another 13 percent specified the name recognition of the school, and 8 percent recognized the importance of degree flexibility. But about 18 percent said that there was nothing at all about their institution that would be attractive to nontraditional students, whereas 7 percent indicated that nontraditional students would be put off from going there (see Appendix Table C.31).

To assess professors' awareness of the differences between nontraditional and traditional students in terms of actual schedules, we asked professors how they saw schedules differing for both categories of students on a daily basis as well as throughout the course of study. About 20 percent said that there were no differences or special treatment of nontraditional students at their institution, completely ignoring the likelihood that nontraditional students might take fewer courses, be on campus less hours, or take longer to finish their degrees. One-quarter of professors said that nontraditional students took night and weekend courses. About 20 percent recognized that nontraditional students take fewer classes and that they were more likely to have outside commitments than their more traditional counterparts. Seventeen percent saw scheduling as

a problem for nontraditional students, but only 11 percent identified a longer time to degree as a result (see Appendix Table C.32).

Most professors (61 percent) did not perceive any friction between nontraditional and traditional students, and only 10 percent saw some friction over campus resources. We found very little evidence from our student and faculty interviews that nontraditional and traditional students might have conflicts. To the contrary, both students and faculty often saw benefits to having a mix of traditional and nontraditional students in the classroom (see Appendix Table C.33).

In terms of day and evening classes, 22 percent of professors said that there were no differences at all between them. About 17 percent mentioned that labs were difficult either to schedule or hold during the evening hours, and 15 percent indicated that mostly adjuncts teach the night courses. Only 11 percent of professors thought that less work was given in the evening classes, but otherwise there were few negative opinions about the quality of instruction in evening classes (see Appendix Table C.34).

### **Internships and career outcomes**

Three of five professors interviewed believe that internships or other external work programs are extremely or very important for traditional students. Only about 15 percent saw internships as having no real impact or not being very important. Those interviewees asked a follow-up question about the importance of internships for nontraditional students saw them as important, especially if nontraditional students were switching fields. Eleven percent said they were not as important for nontraditional students.

The most critical impact of internships and external work programs, according to a majority of professors, was the experience and exposure to the real work environment. Another 28 percent said that students see the practical applications of IT, and 17 percent mentioned better job opportunities for those students who complete an internship (see Appendix Table C.35).

Professors were largely aware of on-campus resources to help students find jobs. Almost 70 percent mentioned an on-campus career office available to students. On-campus recruitment activities by area businesses and career fairs were also men-

tioned. Approximately 11 percent of professors had no idea what kinds of career-related resources were available on their campuses, 7 percent said their career center was not helpful to students, and 4 percent indicated that there was not a career center or career-related activities undertaken at their institutions (see Appendix Table C.36).

When asked about attempts to track the career outcomes of their alumni, about 46 percent of professors thought that there were some attempts to track students, but these were largely unsuccessful. Almost 20 percent said there was no tracking being done, and 14 percent had no idea if anything was being done or not. Approximately 18 percent could list specific activities to track their student outcomes (see Appendix Table C.37).

We then asked if their institution or department had any interaction or contacts with employers to ascertain their workforce needs. Nearly 40 percent indicated that their department or college has a business advisory council, whereas 36 percent said that there were unofficial or informal interactions with employers. When asked if they made course or curriculum changes based on interactions with employers, nearly 40 percent indicated that they made some course or curriculum changes, whereas 14 percent said that they made significant curriculum or course changes. Twenty percent indicated that either no changes or only minimal changes have been made. Over three-quarters of professors said that interaction with employers helped in placing students in internships and jobs (see Appendix Table C.38).

### Characteristics and needs of nontraditional students

We asked professors to reflect on our definition of nontraditional students—beginning college at or after the age of 21 and/or taking longer than six years to finish their degree—and to identify other characteristics that describe nontraditional students (see Appendix Table C.39 and Chart 3.4). Most answers mirrored those categories added by the U.S. Department of Education report, including having children (26 percent), working full-time (15 percent), and attending school part-time (4 percent). Other responses were variations on these additions, such as having outside commitments (14 percent). Around 14 percent of the professors we

interviewed said they had nothing to add to the definition.

Professors were also asked about the most pressing needs of nontraditional students (see Appendix Table C.40 and Chart 3.5). Almost 30 percent listed more time or more time management as a necessity. More resources or financial support was mentioned by about 20 percent of respondents. Almost 15 percent said that nontraditional students need course flexibility, 10 percent said they needed more support systems, and another 10 percent recognized the need for bridging programs or more tutoring to bring nontraditional students “up to speed” with their traditional counterparts.

Around 4 percent identified a “sense of belonging” as important, and this might be the crux of the matter. While nontraditional students might certainly benefit from more time and more resources, feeling that they belong at a university or college and that professors and academic staff understand their challenges and needs as well as their strengths would go a long way to attracting nontraditional students of both genders and all ethnicities to a program.

Nontraditional students may not be that different from their more traditional counterparts. If they are choosing convenience over more traditional programs, it may just be because the more convenient programs also welcome and appreciate students. But nontraditional students are concerned about the reputation of the institution from which they get their degree and have many of the same desires and concerns as traditional students.

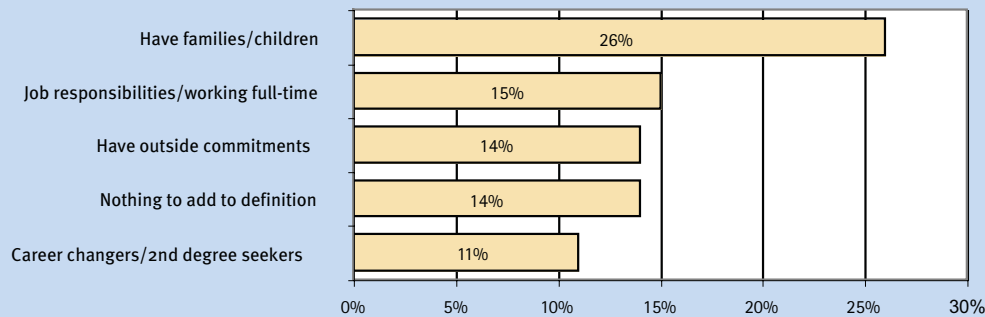
### Conclusions

In general, we found that nontraditional students who find their way into more traditional academic institutions are largely invisible to both faculty and other students. There are very few concessions made for them, either in course flexibility and/or programs to help them fill in gaps in their education or adjust to being back in school. Faculty have some positive opinions about nontraditional students, but they are not very informed about their needs or circumstances. Nontraditional students who choose this path (instead of going to institutions such as Strayer, which may be more likely to cater to their needs) are more likely male and have

considerable experience with higher education, through a community college or having already earned a degree. In short, the same variables that keep women and underrepresented minorities from choosing IT/CS education are compounded for nontraditional students who want to attend traditional universities. Moreover, the trend among traditional universities is to focus more on the traditional student, making it more difficult for nontraditional students to feel like they belong.

Yet, nontraditional students still persevere at traditional universities and do earn degrees in IT/CS. What happens after they graduate is the subject of our next chapter.

**CHART 3.4** Top Five Additional Characteristics Faculty Say Describe Nontraditional Students



Note: Faculty could indicate more than one characteristic.

**CHART 3.5** Most Pressing Needs of Nontraditional Students According to Faculty

