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Divided We Fall: The Federal Government Confronts the Digital Divide

By Charmaine Jackson

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For several decades, education has assumed a vital role in this country's economic, social, and political development, catapulting less advantaged citizens into higher social classes and the political process. A testament to education's fundamental importance in our society are the numerous programs designed during the 1960s to eliminate the barriers to higher education that low-income individuals encounter. However, the last few decades have witnessed a slow erosion of many of those programs. As financial aid legislation is increasingly targeted to middle- and upper-class individuals, low-income students' educational opportunities are being threatened.

This research examines the potential consequences for higher education access if the U.S. Department of Education continues to move forward with its technology plan for financial aid delivery. More specifically, it explores how the transition of Federal Student Aid (formerly Student Financial Assistance) toward a Web-based financial aid application process will affect college applicants—particularly low-income students who often lack access to technology. Using a national data set of financial aid applicants, discriminant analyses (several stepwise) are conducted on selected demographic variables to ascertain the potential impact of this migration.

In 1998, Congress selected a division of the U.S. Department of Education (ED), Student Financial Assistance (SFA)—now known as Federal Student Aid (FSA)—to be the federal government's first performance-based organization (PBO). As a PBO, FSA is allowed to operate outside many of the "traditional constrictions" associated with government bureaucracy: it has wider discretion in regard to procurement and personnel, but most notably, upper management is provided financial incentives for the achievement of pre-established goals and objectives. In adherence to the 1998 amendments to the Higher Education Act, the new chief operating officer (COO) of the division submitted for public viewing the "Performance Plan for Student Financial Assistance FY 2000-FY 2004" (hereafter referenced as "The Plan"), outlining FSA's strategy for improving service, reducing costs, improving and integrating support systems, and developing an open, common, and integrated delivery and information system (2001, p. 1). According to the Plan, the measures of performance for both the COO and FSA have been (1) customer satisfaction, (2) unit cost, and (3) employee satisfaction (Student Financial Assistance, 2001, p. 1).

Because the decision to move aggressively toward the electronic delivery of services is a function of unit costs, for the purpose of this research the second of these three measures is further examined. This measure is also important because FSA's upper management receives financial incentives for achieving pre-established goals and measures, which may mean that the interests of those lacking access to technology will not be adequately considered.

The Plan indicates that, because the movement toward integrated delivery and information systems will drive unit costs up, FSA is committed to cutting additional costs to overcome this inevitable cost increase. "That hard fact compels us to move aggressively away from pushing paper and toward electronic transactions, which provide better service at a vastly reduced unit cost" (SFA, 2001, p. 9). The Plan further states that, "We also know from our own experience that electronic applications are as much as 25 times less likely to contain errors that cost money and delay service. The potential improvement in cost and quality is so large that we must develop strategies to provide electronic service even to those who may not now have access to the Internet" (SFA, 2001, p. 10).

Speaking at the National Association of Student Financial Aid Administrators' (NASFAA) annual conference in 2001, Greg Woods, former Chief Operating Officer of Student Financial Assistance, challenged financial aid administrators to stop ordering so many paper copies of the Free Application for Federal Student Aid (FAFSA). "If we can cut back," he explained, "we can use the money we save to speed the pace of our modernization efforts" (Burd, 2001, p. 2). To encourage aid administrators to direct students to the Internet, Woods proposed a Web site that tracks the number of students per institution that use FAFSA on the Web. The site would also allow institutions to compare themselves with other institutions. It was expected that institutional concern with low ratings would discourage requests for paper applications, which totaled more than 35 million in 2000-2001, and encourage use of the Web-based version (Burd, 2001).

Using Technology While Ensuring Equality

The federal government is faced with a unique challenge. In contrast to the private sector, which can provide services to consumers based upon the availability of resources and individual willingness to pay for those services, the federal government must provide services to all citizens regardless of their ability to pay. This poses a significant problem: How can the federal government provide services using technology and simultaneously ensure equal quality of services for all citizens?

This is where the Plan appears flawed. The problem with the Plan is not the "aggressive" movement away from paper, but the absence of a viable plan for individuals who lack Internet access. Although the Plan does permit paper applications to be

What makes FSA's effort deserving of further research is the potential impact it can have on the composition of higher education.

filed, there is a push to migrate to a paperless process. The only acknowledgment of this potential problem is the Plan's brief mention of "those who may not now have access to the Internet" (SFA, 2001). The Plan also fails to discuss policy alternatives. This disregard for the implications of the "digital divide," as well as the absence of parallel modalities for those who lack access to computer technology and policy alternatives to resolve this issue, is problematic.

Other federal agencies are also moving their services to the Internet, but what makes FSA's effort deserving of further research is the potential impact it can have on the composition of higher education. In the aftermath of several states discontinuing affirmative action plans, an overreliance on standardized tests as the means of establishing merit, and decaying support of financial assistance based on need (Frase, 1995; Hauptman, 1995), FSA's movement toward a Web-based financial aid application can substantially impact which students are able to attend college and pursue the American Dream. If the very students who need higher education to advance them from one class to the next are one day hindered in their ability to apply for financial assistance due to their lack of access to technology, what will the financial aid system become and how will this change academe?

The federal government's move toward electronic delivery of services can be positive if policy alternatives are explored that address the needs of individuals who lack Internet access. This research examines the demographic differences (e.g., gender, income, parent's level of education) between individuals who complete a paper FAFSA and those who use the Web to apply for student financial aid. The study uses data from the 2000-2001 FAFSA for students who reported on the application that 2000-2001 was their first year and that they had never previously attended a postsecondary institution as reported by individual filers to ED. In addition, the application modality (paper, electronic, or Web-based) is examined, as well as application errors. This research tests the following hypotheses:

- First-time filers who complete FAFSA on the Web will commit fewer errors than those using a paper FAFSA. The Web-based version of the FAFSA provides internal and end-of-entry data edits that prevent filers from making certain errors that delay the processing of the application. The paper version does not have a comparable protective application. Thus, it is hypothesized that first-time filers using the paper FAFSA are more likely to commit errors in the absence of data edits.
- Students with lower incomes are more likely to apply for student aid using a paper FAFSA. According to the literature surrounding the digital divide (NTIA, 1999 and Tapscott,

1998), low-income persons are less likely to have access to a computer at home or at work (places most conducive to completing an on-line FAFSA), and therefore are more likely to complete the paper version at home where they can have direct and private access to the background data required to complete the application (tax returns, bank account information, etc.). It is expected that the findings will reveal that FAFSA on the Web is very time efficient, but only for middle- to upper-income families who can afford personal computers. Research shows that individuals with less money and education also have less access to computers and the Internet (NTIA, 1999), and this group most needs financial assistance to attend higher education. If not properly implemented, meaning that the needs of individuals who lack access to technology are overlooked, it is hypothesized that technology could further the gaps that exist between low- and middle-income and upper-income students' college attendance patterns.

Review of Literature

Low-income students face a number of hurdles when considering higher education, particularly as the digital divide grows. Low-income students currently encounter many of these obstacles in their educational pursuits—such as a lack of information and inadequate funding—and the proliferation of technology can actually exacerbate these problems.

Economic Hurdles

Although most groups have made significant gains in higher education enrollment, low-income persons continue to lag behind their higher-income peers. The National Center for Education Statistics (NCES) reports that, "In 1995, 34 percent of high school graduates from low-income families went directly to college, compared to 83 percent of those from high-income families" (NCES, 1997, p. 4). The report further states that students from low socio-economic status (SES) backgrounds are more likely than those from higher SES groups to experience school failure at the primary and secondary levels. Of the low-SES students who do enroll in postsecondary education, a large majority enter two-year institutions (Rendon & Nora, 1994). According to Gladieux, "Young people in the highest-income group (\$75,000) are three and a half times more likely to be enrolled in a college as those from the lowest income range (under \$15,000)" (1995, p. 53).

Hauptman and Smith (1994) echo Gladieux's findings, while also noting that these individuals tend to be racial/ethnic minorities. They maintain that minority enrollment percentages in two-year institutions are larger than their representation in society or in postsecondary education in general. This finding suggests that low-income and minority students who enter postsecondary education are predominantly enrolling in two-

Resta argues that the reason low-income and minority students are not as technologically competent as their counterparts is due to the “inequities in access to and use of computers and related technologies in their pre-college preparation.”

year institutions, and are less likely to attend baccalaureate degree-granting institutions. Moreover, due to the significant decline in transfer rates from two-year to four-year institutions, these students are also less likely than White and higher-income students to earn a baccalaureate degree.

Karen (1991) studied the differences in higher education access between women, Blacks, and low-income persons, and found that at various periods (1960-1976 and 1976-1986), both women and Blacks were able to gain increased access to higher education, and more specifically, access to elite institutions. He asserts that this increased access was in large part due to these groups' recognition as social categories by the federal government and higher education institutions. Karen maintains that there is a correlation between when these groups received recognition under Title VI of the 1964 Civil Rights Act, and when their representation increased in colleges across the country. Conversely, Karen argues that low-income people have failed to gain recognition as a homogenous, organized group, nor were they afforded special legislative protection. Karen asserts that this lack of recognition was what precluded low-income people from making comparable gains in access with Blacks and women.

Paul Resta (1994) argues that the reason low-income and minority students are not as technologically competent as their counterparts is due to the “inequities in access to and use of computers and related technologies in their pre-college preparation” (p. 66). Resta further claims that technological incompetence is most prevalent among low-income groups. He concludes that the lack of income to afford a computer, coupled with lower access and therefore lower competency, further places these students at a disadvantage if and when they enter computer-intensive universities.

The Digital Divide

In 2000, the National Telecommunications and Information Administration (NTIA) report *Falling Through the Net: Toward Digital Inclusion* revealed that, in terms of access to the Internet, “substantial disparities have continued to widen, both when comparing Blacks and Hispanics against the national average and when comparing them against Whites” (NTIA, 2000, p. 16). Specifically, the differential between the national average for Internet access and the average for Black household access increased from 15.0 percentage points in 1998 to 18.0 percentage points in 2000, and from 13.6 in 1998 to 17.9 percentage points for Hispanics in 2000 (p. 16).

In addition to the disparities between computer ownership and Internet access and race, NTIA also showed significant differences across states. A few states had computer ownership rates in the mid-60 percent range, while some had rates in the 30 percent range. Further, some states had Internet access rates

of 50 to 60 percent, while a few states had rates as low as 30 to 40 percent. NTIA concludes its report maintaining, “We are approaching the point where not having access to these tools is likely to put an individual at a competitive disadvantage and in a position of being a less-than-full participant in the digital economy” (NTIA, 2000, p. 89).

NTIA’s research indicates the digital divide has “turned into a racial ravine when one looks at access among households of different races and ethnic origins” (NTIA, 2000, p. 8). The report showed that the gap in home Internet access between Whites and racial/ethnic minorities is widening. In addition to connectivity at home, the report finds that Blacks and Hispanics are less connected everywhere (home, school, library, or community center) compared with their White counterparts (NTIA, 2000).

In *Growing Up Digital* (1998), Tapscott uses U.S. Census data to reveal the relationships between income, education, and technological access. He argues that as each day passes, the digital divide is being exacerbated as the haves (whom he defines as rich, educated, and White) are “getting better access, more services, improved technology and most important, improved fluency and motivation” (p. 287). These results are comparable to those produced by NTIA. Tapscott concludes, “Poverty begets information poverty begets poverty” (p. 259).

Schools, Students and the Digital Divide

Computers & Classrooms (1997), a report conducted by Coley, Cradler, and Engel for the Educational Testing Service (ETS), sheds light on the presence of information technology in America’s primary and secondary school classrooms, and provides a national snapshot of America’s classrooms from a technology perspective. This report compares access to computers by both race and income and by the percentage of Title I recipients within each school. (Title I of the Elementary and Secondary Education Act distributes grants to entities that provide programming, tutoring, educational training, and other services to low-income and minority children.) The report determined that there is a strong correlation between the percentage of schools that are eligible to receive Title I grants and the student-to-computer ratio. For example, school districts where less than 25 percent of the schools are eligible to receive Title I grants have a 10:1 ratio of students to computers; whereas school districts in which 90 percent of the schools are eligible to receive Title I grants have a 17:1 student-to-computer ratio (Coley, Cradler & Engel, 1997). The report concludes that the students who require the most access at school (minority and low-income students) are the ones who have the least individual access to technology. Additionally, although the purpose of Title I funds is to assist these schools, the funds are not able to place

The gap in home Internet access between Whites and racial/ethnic minorities is widening.

them in technological parity with schools not receiving Title I funds.

The Virtual University and Educational Opportunity (Gladieux & Swail, 1999) examines the role of technology as an aid to bring higher education to those who have traditionally been denied access. The report focuses on Western Governors University (WGU)—the first exclusively virtual university in the United States—and the California Virtual University to ascertain the accessibility of higher education to individuals traditionally denied access to higher education institutions. The report shows that the Internet can tear down barriers to higher education access, but admits, “Virtual universities only help those who have the necessary equipment and experience to be comfortable with the technologies” (p. 17). The authors further note, “While computers may seem ubiquitous in today’s society, their distribution is highly stratified by socio-economic class” (p. 17). Gladieux & Swail question what education will mean as we progress towards a more technologically dependent society, stating, “While education is the great equalizer, technology appears to be a new engine of inequality” (p. 20).

Congress attempted to conquer the digital divide by extending the concept of universal access.

The Federal Government as Problem Solver?

In 1996, Congress attempted to conquer the digital divide by extending the concept of universal access—a federal subsidy applied to those utilities that are deemed essential to life in American society such as the telephone—to include the Internet. Section 254 of the Telecommunications Act of 1996, which ensures universal access to consumers, states

Consumers in all regions of the nation, including low-income consumers and those in rural, insular and high cost areas, should have access to telecommunications and information services, including inter-exchange services and advanced telecommunications and information services, that are reasonably comparable to those services provided in urban areas and that are available at rates that are reasonably comparable to rates charged for similar services in urban areas.

Beyond the obvious extension of universal access as a concept, Section 254 affirms the belief in information technology as a critical tool for life in our society. In a report to convince lawmakers of the importance of universal access, the Benton Foundation (2000) argues, “Certain communications tools are so fundamental that their provision shouldn’t be left to the vagaries of the marketplace alone” (Benton Foundation, p. 1). They further assert, “Access to basic information and communications tools increasingly shapes our ability to manage our complex lives, participate in civic affairs, acquire learning skills needed for economic success, and enjoy social and cultural life” (p. 1).

The Cato Institute (1998) argues against Congress' universal access plan, contending that these programs are "largely payoffs to politically influential groups. Markets alone would ensure that the benefits of the information age were widely shared, even among the poor" (Gasman, 1998, p. 3). Gasman questions the appropriateness of such a broad-sweeping policy considering there is little evidence to support the need for such a policy. He states, "The leap from the importance of telecommunications to the need for subsidies to prevent the emergence of information have-nots is not based on any evidence or logic. There is every reason to think that telecommunications technology will spread through society just as automobiles, televisions and flush toilets did" (p. 8).

E-GOV: The Government and Electronic Commerce

As the government ventures toward electronic commerce, it is incumbent upon agencies to broach simultaneously the digital divide for those who lack access. The U.S. Department of Commerce estimates that during the early part of the 21st century, 75 percent of all transactions between the federal government and individuals will occur electronically (Benton Foundation, 1998), potentially leaving individuals who lack access at a considerable disadvantage. Discussing the possible problems that may arise from this shift, James Katz asserts, "The information poor will become more impoverished because government bodies are displacing resources from their ordinary channels of communication onto the Internet. To the extent any demographic group becomes excluded from and underrepresented on the Internet, it will also be excluded from the economic fruits that such participation promises" (Benton Foundation, 1998, p. 6).

In a report conducted by the now-defunct Office of Technology (OTA), *Making Government Work: Electronic Delivery of Federal Services* (1993), OTA argues that due to increasing demands for less-costly government, more productivity and results, and the expanded use and acceptance of information technology, greater use of electronic services is "inevitable" (OTA, 1993, p. 5). Nonetheless, OTA also cautions against the potential inequality that the movement toward electronic services can produce. "Assuring equitable access is important to reduce, not widen, the substantial gap between the information 'haves' and 'have-nots'" (OTA, 1993, p. 19).

Method

Quantitative Methodology

Using data from the FAFSA for the 2000-2001 academic year (July 1, 2000 to June 30, 2001), this study uses a series of stepwise discriminant analyses to examine selected variables from the FAFSA data set. A stepwise discriminant analysis was chosen to eliminate statistically insignificant variables. The stepwise procedure selects those variables that have the most significant explanatory power. Although the stepwise procedure

One of the important relationships examined in the study was the application method (paper, electronic, or Web) and the number and type of errors.

often does not produce an optimal discriminant function, due to the large number of variables in this case, it is the most appropriate technique.

The data used in the study are partially self-reported information entered by students and/or parents on the FAFSA. ED converts the students' data to an electronic format, analyzes it, and transmits it to institution(s) indicated by the students. The data transmitted to the schools also contains information gathered by ED, such as the method of application (paper, electronic, or Web) and the number of transactions submitted by the applicant. FAFSA data were chosen because all students who wish to receive federal financial assistance must file the FAFSA, and 48 out of 50 state education-financing entities require prospective aid recipients to complete the FAFSA. Thus, the use of FAFSA information allows the researcher to capture data for a large percentage of students seeking financial assistance to attend college.

One of the important relationships examined in the study was the application method (paper, electronic, or Web) and the number and type of errors. The errors served as a measure of aid applicants' level of familiarity with technology and the application process.

In addition to the errors recognized by ED, such as the omission of signatures or incorrect calculations, there are several other errors that applicants can make and still have their applications processed. For example, if a student does not enter the federal code to indicate the school(s) he or she is selecting to receive the information, or the student does not indicate a specific year in school, the application will still be processed. To capture missing but relevant data, the variable "blank information" was created. This variable also served to represent the applicant's level of familiarity with both the application and the method by which the application was completed.

Of the three ways a student can choose to complete and file a FAFSA, (paper, electronic, or Web), the paper and the Web-based application processes are somewhat self-explanatory. However, the electronic version of the FAFSA requires a brief explanation. The electronic version of the FAFSA may be completed and filed via a personal computer and specially designed FAFSA Express software. In addition to FAFSA Express, applicants are also able to file the FAFSA electronically through their institutions via ED Express software. With ED Express, the institution submits the applicants' information on behalf of the students. ED distinguishes between FAFSA Express filers and ED Express filers; however, there were not a significant number in either category to put them into separate groups. For this analysis, they were grouped together into the category "electronic filers."

There are some similarities between the electronic and Web-based applications in that they both require a computer,

There are notable demographic differences between filers. The adjusted gross income (AGI) for parents is higher for Web-based users than for paper or electronic filers. Additionally, more paper filers have incomplete or blank information on their FAFSA.

but there are also some distinct differences between the two versions. Unlike FAFSA on the Web, the electronic versions of the FAFSA do not contain internal data entry methods that limit the number of potential mistakes. The electronic versions also do not permit the student to save the information to a computer hard drive. The electronic version requires that the filer use an IBM-compatible computer with a Windows operating system—something not required of the Web-based version. As a result of these key differences, the electronic filers and Web-based filers are separated for this analysis and not grouped together as computer applicants.

According to ED, due to the low numbers of applicants who used FAFSA Express, 2001-2002 was the last year that the general public could apply for federal student aid using FAFSA Express (U.S. Department of Education, 2001). In 2002-2003, ED allowed members of designated groups (TRIO programs and military bases outside the United States) to continue using this version, but it has been completely eliminated in the 2003-2004 academic year. Although the electronic version of the application is no longer available, it was important to include these filers in the analysis to avoid over-representing either the paper or Web-based filers. Also, future research might help determine to which method (paper or Web) the FAFSA Express users migrate.

Because the low occurrence of errors among the cases prohibited the performance of a discriminant analysis, a cross-tab analysis was used to test the first hypothesis. The cross-tab analysis was used solely to determine the strength of the statistical relationship and not the direction.

Quantitative Analysis

The dependent variable has three categories: electronic, paper, and Web-based applications. In academic year 2000-2001, there were approximately 10 million FAFSA filers. Of these, roughly 2 million indicated that they were first-time, first-year undergraduates. The sample was acquired by requesting a random selection of individual records for 3,000 filers. An applicant can submit more than one application—which resulted in 5,033 records—in more than one method (electronic, paper, or Web). In most instances, the most recently submitted application was chosen for inclusion. If a student made a mistake on one of the submissions, that submission was included. Because the purpose of the study is to determine if filers have a proclivity to use one method over another, individuals who submitted multiple applications using more than one method were eliminated from the study. There were 2,969 individual records used for this study.

There were 1,211 cases deemed valid to be included in the discriminant analysis. Approximately 59 percent of the cases were excluded from the analysis section of the discriminant

analysis, but included in the classification (i.e., the second part of discriminant analysis). By default, discriminant analysis excludes any cases that are missing values for any of the variables, including the dependent variable, from the analysis section.

For this application, however, the mean value for all missing variables was included in the classification section and the variable “blank information” was used to capture all missing information in each application. As mentioned earlier, this variable was used to test both individual familiarity with the application and the method by which the student applied. As a result, a value for the cases with missing information was not included for the first part of the discriminant analysis.

There are notable demographic differences between filers. The adjusted gross income (AGI) for parents is higher for Web-based users than for paper or electronic filers (see Table 1). Additionally, more paper filers have incomplete or blank information on their FAFSA, as noted by the mean of .14. The mothers of the Web-based filers were more likely to have completed college (41.1%) than the mothers of the paper filers (37.5%) or electronic filers (27.0%). The same is true for father’s education; 43 percent of the fathers of Web-based filers completed college, compared with 36.4 percent of those who filed the paper FAFSA, and 23.2 percent of those using the electronic version.

Table 1
Group Statistics (Means) for Selected Variables

| | Electronic | Paper | Web |
|---------------------------------|-------------------|--------------|------------|
| Student’s adjusted gross income | 4,247.44 | 2,957.04 | 3,461.58 |
| Parents’ adjusted gross income | 42,346.30 | 54,845.59 | 65,805.04 |
| Blank information* | .10 | .14 | .06 |

**Dummy variable: “0” indicates no blank information and “1” indicates blank information.*

Two discriminant functions were performed. The discriminant function explains which linear combination of variables collectively work best to discriminate between the groups of the criterion variable. As noted by Table 2, the first discriminant function (df1) has an eigenvalue of .325, which translates into a variance of 90.5 percent. The larger the eigenvalue, the more powerful the discriminant function. The canonical correlation of .495 indicates that df1 is useful in explaining differences between the groups. The second discriminant function (df2) has a smaller eigenvalue (.034). However, it does explain

approximately 10 percent of the variance in the dependent variable. Wilks' Lamda shows that both df1 and df2 are statistically significant as the values are less than one. Chi-square also reveals that both df1 and df2 are significant at the <.001 level.

**Table 2
Eigenvalues**

| Function | Eigenvalue | Percentage of Variance | Cumulative Percentage | Canonical Correlation |
|-----------------|-------------------|-------------------------------|------------------------------|------------------------------|
| 1 | .325 | 90.5 | 90.5 | .495 |
| 2 | .034 | 9.5 | 100.0 | .182 |

The first discriminant function (df1) shows that the type of college (four-year, two-year, less than two-year) and type of degree (associate's, bachelor's, or certificate/diploma), best discriminate between the methods applicants use to file the FAFSA. In the second discriminant function (df2), the amount of blank information on the application and parents' adjusted gross income best explain how an individual has applied.

As illustrated in Table 3, several variables relating to the students' intended educational pursuits are highly correlated with the discriminant function. For example, college type and certificate/diploma sought have high canonical coefficients, -.817 for college type and .724 for certificate/diploma sought. For df2, the variables blank information and parent's adjusted gross income have the highest canonical coefficients with scores of .640 and -.554, respectively. The coefficients explain how much each variable is related to each discriminant function. The closer the coefficient is to +1 or -1, the greater the magnitude of the relationships. In the first discriminant function, college type is

**Table 3
Structure Matrix**

| | Function | |
|--------------------------------|-----------------|----------|
| | 1 | 2 |
| College type | -.817 | |
| Certificate or diploma sought | .724 | |
| Bachelor's degree sought | -.659 | |
| Associate's degree sought | .440 | |
| Blank information | | .640 |
| Parents' adjusted gross income | | -.554 |
| Teaching credential sought | | .514 |
| Parents married | | .251 |

negatively related to the function; the same is true for parents' adjusted gross income in the second discriminant function.

There are two phases in the discriminant analysis. The preceding discussion addressed the analysis/description phase, which describes the relationships of different variables to the functions. The second phase, classification/prediction, determines if the discriminant functions that were produced accurately classifies individuals in the different classes of the dependent variable. The discriminant function was able to correctly classify about 66 percent of the cases. The discriminant function was able to correctly classify nearly 91 percent of the paper filers and slightly less than 50 percent of the electronic cases, but it only correctly classified 1.6 percent of the Web filers.

To determine if paper filers committed more errors than Web filers, a cross-tab analysis was conducted. Paper filers committed significantly more errors than the other two groups. In fact, in other areas where errors were committed, paper filers were more than twice as likely to commit an error (incomplete application 17:1). The first hypothesis, individuals who complete FAFSA on the Web will commit fewer errors than paper filers, appears to be supported by the data.

To test the second hypothesis, another discriminant analysis was conducted using only the variables adjusted gross income (parent and student), current household size and post-high school household size. The results from the stepwise method show that only the adjusted gross incomes of the student and parent were significant at the <.001 level and thus able to be included in the discriminant analysis. The eigenvalues indicate that the first discriminant function explains approximately 78 percent of the variance, and the second function explains the remaining 22 percent. The structure coefficients show that parental income contributes most to the function with a score of .894 in df1, while student income has a structure coefficient of .912 in df2.

Table 4
Structure Matrix

| | Function | |
|---------------------------------|-----------------|----------|
| | 1 | 2 |
| Parents' adjusted gross income | .894 | .448 |
| Student's adjusted gross income | -.410 | .912 |

Similar to what occurred in the previous discriminant analysis, the model accurately classifies 97 percent of the paper users, but it misclassifies 91 percent of electronic filers and almost all Web filers (only 0.4% correctly classified).

Financial aid as “the thing that nobody talked about” appeared as a theme throughout the interviews.

Qualitative Methodology

In addition to examining the aggregate trends, individual applicants’ perceptions of their accessibility to the FAFSA were examined to determine whether it was affected by their access to technology. Conducting individual, in-person, semi-structured interviews allowed the applicants to share their experiences with the financial aid process, computer usage, and the applicant’s parents’ level of familiarity with technology. Applicants were also asked about their own and their parents’ access to and use of the Internet, because each of these factors might influence aid applicants’ ability to choose between a paper form or the Internet version. It also may reflect the ability of the parents to assist with the completion of the application.

A semi-structured interview guide was developed to gather information that could not be obtained from the aggregate data set, such as race, persons who assisted with the completion of the application, reasons for choosing a particular method to complete the application, and the amount of time taken to complete the application. Because the interviews were semi-structured, a few themes continually arose that warrant further discussion and are highlighted under “Qualitative Analysis.”

The interviews provide a “face” for the data analyses and do not serve as the foundation of the research. Furthermore, the group is not a representative sample of all first-time FAFSA filers. The interviews serve to share the experiences of a few select first-time FAFSA filers. They also provide insight into the application process that cannot be obtained from the data. For example, the data cannot describe who, if anyone, assisted with completing the FAFSA; how much time it took to complete the application; and how much experience the applicant’s parent(s) have with computers and the Internet. The interviews also provide demographic information such as race, which is not included in the FAFSA data set. The additional information gathered from the interviews also assists with the development of future research questions and policies to address some of the technology issues surrounding the Web-based FAFSA.

Interviews were conducted with 14 undergraduate students attending college in Southern California. The selected individuals ranged in age from 18-38. Eighty-two percent (12 out of 14) of the group were traditional college-age students (i.e., ages 18-24). Interview participants were selected by using a snowball approach. The snowball approach helps the interviewer identify and recruit potential cases from individuals that know persons that fit the interviewer’s criteria (Creswell, 1998). The sample consisted of six men and eight women. The race/ethnicity of the interviewees was as follows: five White, non-Hispanics; three Blacks; three Asians; one Latino; and two bi-racial/multi-racial (Black/White, and Asian/Hawaiian/White) students. Four of the interviewees were considered independent for the

purpose of receiving federal financial aid. Two of the interviewees were non-citizen permanent residents of the United States: one is from Korea and the other from Latvia. Of the 14 interviewees, seven attended two-year public community colleges, five were enrolled at four-year public institutions, and two attended four-year private institutions.

Qualitative Analysis

Financial aid as “the thing that nobody talked about” appeared as a theme throughout the interviews. Although most interviewees applied for some type of financial assistance, many indicated that they had very little knowledge about financial aid prior to entering college. Only three of the 14 students indicated that they were moderately aware of the availability of financial assistance and all of them were from families with lower incomes. One of the students, an Asian male, indicated he was aware of Federal Stafford Unsubsidized Loans. Another male student who attended a community college stated that he knew about financial aid because the admissions office at the college referred him to the financial aid office. The other 11 interviewees (78%) had only minimal knowledge about financial aid availability. Of this group, six said that what they knew about financial aid they learned from their parents and/or high school counselors. Others revealed that they became aware of financial aid during their senior year in high school.

Of the ten individuals who applied for financial assistance, nine either had siblings who attended college or had at least one parent with a degree and/or had moderate (\$35,000-\$49,000) or upper-level (\$75,000-\$99,000) incomes. These results are consistent with national findings from a study conducted by the United States General Accounting Office (GAO) in 1990, which reported that both college-bound students and the parents of college-bound students are generally unaware of federal financial aid programs. More specifically, students from lower-income families are generally more aware of Federal Pell Grants, while upper-income students are more aware of federal student loan programs (GAO, 1990). The GAO study further found that family income and having siblings who attend college increases the likelihood that a student will receive the necessary information regarding financial aid. Only four of the ten financial aid applicants reported that their parents steered them in the right direction to seek and/or apply for financial aid. Interestingly, each of their parents also possessed a postsecondary degree. Conversely, of the six that received information from teachers or counselors, four had siblings that previously attended college or were currently enrolled and three had parents with moderate to high incomes. All of their parents had low levels of education, however.

There appears to be an important difference between having computer and Internet access, and actually using the

Students from lower-income families are generally more aware of Federal Pell Grants, while upper-income students are more aware of federal student loan programs.

available technology. When the students were asked about their parents' access to a computer and the Internet, all responded that their parents had access to both at home. But, when asked about parental usage of technological devices, several replied that their parents seldom used them. One student indicated that her mother's computer and Internet skill levels were low, responding, "Mom is way low. She doesn't know how to turn on the computer. She's got a typewriter."

Of the ten individuals who completed a FAFSA in 2000-2001, nine identified one or both of their parents as having low Internet skills, on a scale ranging from low to high. The low levels of parental Internet skills are worth noting because, of the five interviewees who indicated that they completed the FAFSA on-line with the assistance of their parents, four of them also indicated that one or both of their parents' Internet skills were low. Thus, it appears as though moderate to advanced Internet skills are not required for parents to assist their children with the completion of the Internet-based FAFSA.

Discussion

Gladieux and Swail (1999) depict education as the "great equalizer." They also contend that technology is assuming the role as the "engine of inequality" (p. 20) and it is currently battling with education. When combined, both technology and education's potential promise and peril are presented. Technology and education can remove barriers that previously existed due to location, socio-economic status, and physical disability. Conversely, if not properly implemented, these same promises can result in increasing inequity in opportunity for some students. Because technology has paired with the federal financial aid system, a lack of access or lack of experience with technology can further prevent low-income students from pursuing their college aspirations. Unfortunately, there is little research focusing on this issue.

The review of the literature, the interviews, and the data analyses reveal the following:

- low-income students are more likely to use a paper application;
- low-income students require financial assistance to pursue their higher education aspirations;
- ED is aggressively moving toward a paperless financial aid application;
- students are generally unaware of financial assistance, although students whose parents and/or siblings have pursued higher education tend to have more knowledge about financial aid; and
- according to the findings from the interviews, many parents assist their children with completing the FAFSA, however the assistance tends to be more related to tax and income information.

Based on the interviews, a lack of access to a computer and the Internet does not appear to be an obstacle for students—most appear to have access to both. In addition, data from the Advisory Committee on Student Financial Assistance indicate that a significant number of first-time applications continue to be submitted in the traditional paper format (Advisory Committee, 2002). Approximately 2.6 million original paper FAFSAs were submitted for the 2002-2003 award year versus 2.8 million original FAFSA on the Web applications (Advisory Committee, 2002). Why have first-time applicants not thoroughly embraced the use of the Internet to file their FAFSAs, as they have for sending e-mail and making purchases? In the interviews, both paper and Internet filers indicated that the FAFSA is difficult to complete. The complaint mentioned most often was related to parental tax information and income, as students did not appear to be very knowledgeable about these data. Slightly more paper filers found this to be true; however, the Internet version only shows the applicable sections to the applicant, which might influence the perceived difficulty for paper filers.

According to comments made in the interviews, many students did not know what to expect once they submitted their application. Most stated that the result would be an administrative action, for example, that they would receive confirmation of receipt of their application, “a letter or something,” or they simply indicated they were not sure. One student replied, “Definitely hopeful that I would get aid. I was uncertain. They didn’t give me a clear answer.” Of the ten individuals who completed the FAFSA, only one was able to explain adequately the next step in the student aid decision-making process. In response to the question of what did he expect to happen once he completed the application, he replied “Uh, that they would evaluate my need of assistance for education post high school?” Although this student’s knowledge of the process exceeds his peers, his understanding is not completely accurate.

The students’ responses imply an apparent disconnect between FSA’s goals and objectives and the students’ experiences with the financial aid process. For example, one of the ways FSA proposes to improve customer satisfaction is by making the Student Aid Report (SAR)—the report aid applicants receive after their FAFSA data is processed by ED—easier to understand. But the fact that a majority of the interviewees were not able to explain what would happen once their FAFSA was submitted (the receipt of the SAR is the next step) suggests that FSA has not successfully communicated the process to students, or that students are simply uninformed about the process. Either way, the resulting lack of information and an improper understanding certainly hinders customer service.

Conclusions

Overall, this analysis provided substantive insight into financial aid applicants and the application process. The interviews

and the data analysis produce results that can serve as the foundation for future research. Because the discriminant analysis is able to predict accurately which applicants are most likely to file a paper application, policies can be developed to encourage them to use either the Web-based application or to find comparable alternatives.

Technology has the potential to offer new opportunities for college and financial aid for many individuals who have previously been precluded from participating in education. But if not properly implemented, and if the digital divide is not closed, technology can exacerbate many of the existing gaps in college participation between rich and poor.

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