THE INFLUENCE OF ETHNIC BACKGROUND, GENDER AND AGE ON STUDENT PERFORMANCE IN DISTANCE LEARNING PROGRAMS

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The role of distance learning in higher education has exploded in recent years. The Sloan Center for OnLine Education reports that the number of students taking online courses has been growing at approximately 20 percent per year and that more than 1.9 million students were taking an online course in the United States in Fall 2003 (Carlson, 2004). However, this does not reflect the full impact of distance education, for still other students engage in distance learning via television, PCs, compact disks, DVDs, and the like.

Because distance learning is still a relatively new phenomenon, certain aspects of it have not been as thoroughly researched as other, most established educational innovations. For example, we have relatively little hard data that informs us about which students actually succeed in distance learning. It isn't that research studies are being conducted and their results published, but rather the nature of that research. The most comprehensive review of research in distance education counted 1,419 articles and abstracts that appeared in major distance education journals and as dissertations, 1990-1999 (Berge and Mrozowski, 2001). One hundred or more of these studies focused upon various measures of student success (such as grades, subsequent academic progress, and persistence) in distance learning courses.

Alas, these studies have produced contradictory answers concerning the determinants of student success in distance learning (Berge and Mrozowski, 2001; Machtmes and Asher, 2000). A reason for this is the great variety of distance learning programs that currently exist. What may be true for online learning, for example, may not also hold true for distance learning programs that rely upon fully-streamed video.

Perhaps even more important, there have been significant methodological problems associated with most previous distance learning studies. Sample sizes typically have been small and usually there has been no control group. It is difficult to attach strong significance to a study that focuses on, say, 50 students who take an engineering distance learning course unless one can compare these individuals to other students who take the same course from the same instructor at the same time, but do so in a conventional bricks and mortar situation. Only then can one pinpoint the actual impact of distance learning, per se, on student learning. One of the few studies that has incorporated both a large sample and a valid control group is Koch (2005).

Perhaps the only truly strong conclusion emerging from previous empirical studies of distance learning is the oft-cited "no significant difference" finding (Saba, 2000). An entire web site, http://teleeducation.nb.ca/nosignificantdifference, exists that details 355 such "no significant difference" studies. Yet, while these studies are valuable, usually they do not tell us why some students achieve better grades than others when they utilize distance learning.

This paper focuses on the effects of ethnic background, gender and age on the distance learning performance of American college students. It does not purport to offer universal truths about distance learning because it focuses on: (1) interactive television; and (2) American students. Still, it moves us several steps forward in terms of

our knowledge because it involves a large sample (76,866 individual student observations) and an invaluable control group of students who took the identical course at the same time from the same instructor, but did so "in person" in a conventional "bricks and mortar" location.

The results indicate that both ethnic backgrounds and gender are statistically significant determinants of student success even after differences in student ability and/or background are taken into account.

THE NATURE OF THIS SAMPLE

The data consist of 76,866 student performances in distance learning courses at Old Dominion University, 1994-2001. Old Dominion, a public doctoral institution enrolling more than 20,000 students, has been heavily involved in distance learning for almost two decades. The predominant Old Dominion distance education model (and the only one involved in this data sample) involves the transmission of televised courses to more than 60 locations in the United States, several foreign countries and U.S. Navy ships at sea. Approximately 30 complete degree programs are offered, with about 20 at the baccalaureate level and ten at the master's level. All of the undergraduate programs are "degree completion" such that students already have accumulated two years of college credit before they begin their program and hence no freshmen or sophomore students are part of the sample. The system is known popularly as TELETECHNET and currently generates about 25,000 annual student registrations.

The televised courses typically are "one-way video, two-way audio" in nature. Students can see the instructor and talk back and forth to her, but most faculty cannot see their students, though their students can see them. (This turns out to be an important point to which we will return below.) While Old Dominion does offer some fully oes streamed video distance learning courses to students who may be located anywhere a high quality Internet connection exists, and does some two-way television courses, none of those students are included in this sample.

Old Dominion University distance learning students travel to one of the University's distance learning centers in order to access a course. These centers typically are located at a community college, military base, or corporate site. At these locations, students enter a technology savvy classroom in which they access the course at a predetermined time. Students utilize watch television screens, but also have microphones and microcomputers. Each site has a "site director" who advises and assists students, helps them iron out predictable registration and financial aid problems, and ensures that the system works as advertised. The site directors also help students access library materials. The institution offers students extensive digital library access and 72-hour turn around time for all non-electronic library materials that do not require interlibrary loans. Site directors also proctor examinations and make videotapes available to students who miss a class, or who wish to review course materials. Muilenburg and Berge's (2001) factor-analytic study of barriers to distance education found such student support services to be a "critical facet" of quality distance learning programs.

Nearly all of the distance learning classes being received by students at the 60+ locations are simultaneously being offered in a bricks and mortar classroom on the University's home campus in Norfolk, Virginia. Hence, participating faculty members teach both a conventional classroom of home campus students along with distance learning students. In the statistical work reported in this paper, the Norfolk-based bricks and mortar students are the control group. They

take the identical course from the same instructor at the same time and the course requirements, examinations, and the grading standards applied to them are identical. These control group students address the criticism of Machtmes and Asher (2000) that most studies of the effectiveness of distance learning that have attempted to provide control groups have suffered from methodological problems such as noncomparable instructional content, or because students have taken the same course, but from different faculty members. Only one previous study (Bisciglia and Monk-Turner, 2002), focusing upon student attitudes and involving 238 students (both distance learning and bricks and mortar), has utilized such a control group.

In addition, the University's distance learning courses are received at four regional campuses in Virginia (Loudoun County, Virginia Beach, Hampton, and Portsmouth). These sites are especially well appointed with technology, library, and staff support. They might be characterized as "super" distance learning sites, at least in terms of technology and support capabilities.

Approximately 71 percent (54,786) of the students in the sample are undergraduates. The empirical analysis presented below separates undergraduate and graduate students. The large sample size is fortuitous because not all data observations are complete. An individual piece of data often may be missing in a student's file. For example, one student's ethnic background may be unknown, while another student's past distance learning experience may not have been recorded. As a consequence, depending upon the regression specification utilized in the statistical analysis, observations may drop out of the sample because of missing values. Nevertheless, the sample sizes utilized in this study still are much larger than those reported in previous studies.

SAMPLE CHARACTERISTICS

What are the characteristics of the distance learning students in the sample? Table One reveals that the majority (more than 71 percent) are undergraduates and two-thirds are women, up from 63 percent in 1998 (Koch, 1998). Women students dominate distance learning even more so than conventional bricks and mortar education, where 56.3 percent of undergraduate students were female in 2001-2002 *(Chronicle, 2004).*

Approximately three-quarters of the students in this sample are white. "Approximately" is the appropriate adverb because about ten percent of students declined to indicate any ethnic status, or perhaps checked multiethnic status. Such students are not included in the empirical analysis.

The mean age of these distance learning students is 33.4, with the typical woman student being slightly more mature, 33.9. Thus, these distance learning students are older than the typical college student nationally (NCES, 2002, reported that the mean age of an undergraduate was 26) and about five years older than the typical "bricks and mortar" Old Dominion student.

Almost two-thirds of these students received the course via television at a community college site, while 18 percent received the course via television at one of the University's "super site" regional campuses, and 2.6 percent utilized television on the home campus. The 10,959 students (14.3 percent) who took the course in the home campus brick and mortar classroom from the faculty member simultaneously teaching the three previous groups of distance learning students constitute the control group.

Does distance learning success depend at least partially upon students' previous higher education and distance learning experience? This has been issue raised in previous distance learning research and touches upon "learning by doing" notions. Two types of experience are

reported in Table 1. The first---the mean number of TELETECHNET courses taken previously---addresses specific distance learning experience, though it is possible some of these students may have taken distance learning courses from other institutions. Not surprisingly, Table 1 tells us that students at the community colleges sites and the regional campuses have more distance learning experience than those who accessed the course on the main campus.

The second type of experience is institution specific and records the number of Old Dominion credit hours students accumulated prior to this course. Plausibly, knowing the ropes at an institution is valuable, for example, in acquiring information about faculty, registration procedures, financial aid, veteran's affairs, and so forth. Main campus students (who do relatively little distance learning) have substantially more Old Dominion experience than off campus students, who probably were only recently admitted to the University.

What record of past academic success have the students in the sample accumulated? The mean high school grade point average was 3.2 for students who entered as freshmen. The great majority of TELETECHNET students, however, transfer into the University and take their distance learning courses at a community college site, frequently the one from which they just have graduated. Upon transferring, their mean grade point average was 3.03. This is very close to the all-University average for transfer students, but clearly not as high as conventional students who enter the institution as freshmen. This is factor that must be included as a control factor in subsequent empirical work.

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TABLE - 1

CHARACTERISTICS OF THE 76,866 DISTANCE LEARNING STUDENTS IN THE SAMPLE

Enrollment	
Undergraduate	54,786 (71.3%)
Graduate	22,080 (28.7%)
TOTAL	76,866 (100.0%)
Gender	
Male	25,564 (33.4%)
Female	51,202 (66.6%)
Ethnic Background	
White	56,989 (74.1%)
African American	10,061 (13.1%)
Asian American	2,157 (2.8%)
Other or Unknown	7,659 (10.0%)
Mean Ages	
Entire Sample	33.4
Men	32.2
Women	33.9
Undergraduate	32.6
Graduate	35.3
Main Campus, Bricks and Mortar	27.8
Main Campus TV	27.9
Community College Sites	34.2
Regional Campuses	32.5
Site Where Student Took Course	
Main Campus, Bricks and Mortar	10,959 (14.3%)
Main Campus TV	2,031 (2.6%)
Community Colleges	49,823 (64.8%)
Regional Campuses	14,053 (18.3%)
Mean Number of Credit Hours Taken Previously at ODU	
Undergraduate	
Main Campus, Bricks and Mortar	67.4
Main Campus TV	64.7
Community College Sites	25.1
Regional Campus Sites	48.2
Graduate	
Main Campus, Bricks and Mortar	22.5
Main Campus TV	23.6
Community College Site	15.9
Regional Campus Site	20.3
Mean Number of TELETECHNET Courses Taken Previously	
Undergraduate	
Main Campus, Bricks and Mortar	.42
Main Campus TV	.72
Community College Sites	2.12
Regional Campuses	1.46

Who are the distance learning faculty? Table 2 shows they average 46.7 years of age, most typically occupy the assistant or associate professor ranks, and almost 60 percent are tenured. Of the 261 faculty in the study, 64 percent are men, while 78.4 percent have earned the terminal degree in their field (below the University average of almost 90 percent). As a group, they are predominantly white.

TABLE - 2
MEAN CHARACTERISTICS OF 261 DISTANCE LEARNING FACULTY

Age	46.7
Academic Rank (Full Prof. = 4)	2.6
Years at Old Dominion University	8.4
Tenure	59.5%
Terminal Degree	78.4%
Male	64.0%
Female	36.0%
White	86.7%
African American	6.5%
Asian	7.8%

Old Dominion University grades its students on a conventional F through A grading scale, where F = 0 and A = 4. However, faculty also may assign "plus" and "minus" grades and hence the number of available grading intervals is 12. As Table 3 indicates, the mean undergraduate grade assigned to the upper division students in the courses surveyed in this sample was 2.99, while it was 3.56 at the graduate level. At the undergraduate level, off-campus students (those at the community colleges and the regional campuses) earned higher grades than those on campus. This finding, if supported in a multivariate analysis, would constitute an interesting variant of the "no significant difference" hypothesis. Here, there is a significant difference, but it is in favor of distance learners, though this difference disappears at the graduate level. Of course, much depends here upon the qualifications, characteristics and disciplines of distance learners. Further, selection bias could be present here. For example, it's possible that TELETECHNET students simply are more motivated and more disciplined.

One of the most eye-catching relationships is the differences in grades earned by various ethnic groups. In general, white students earn higher grades than Asian and Asian American students, who in turn earn higher grades than African American students. Similar relationships hold true nationally (NCES, 2002). These differences will be investigated in detail below.

TABLE 3
MEAN GRADES EARNED BY DISTANCE LEARNING STUDENTS

(A = 4.00)	
Undergraduate	2.99
Main Campus, Bricks and Mortar	2.79
Main Campus TV	2.81
Community College Sites	3.05
Regional Campuses	2.86
Male	2.79
Female	3.10
White	3.09
African American	2.61
Asian	2.66
Graduate	3.56
Bricks and Mortar	3.56
Main Campus TV	3.59
Community College Sites	3.55
Regional Campuses	3.54
Male	3.46
Female	3.62
White	3.65
African American	3.21
Asian	3.47

EMPIRICAL ANALYSIS

Table 4 contains several regressions that attempt to predict student distance learning grades on the basis of the characteristics we explored in Tables 1 and 2. The basic equation specification is the following:

Grade = f(Location, Student Characteristics, Faculty Characteristics)

location where students receive the course, student personal characteristics such as age, ethnic background, and higher education experience, and the characteristics of the faculty teaching them. Equation 4.2 differs from Equation 4.1 only in that it introduces as an explanatory variable the high school grade point average of students, if that is available. Frequently, the HSGPA variable is not available, since a significant majority of these students transferred to Old Dominion University with junior or senior status. This reduces the sample size to 2,345. Equation 4.3, in turn, differs from Equation 4.1 only in that it includes the transfer grade point average of the students as a predictor variable. This reduces the sample size to 7,390.

Let's focus initially on Equation 4.1, where we have 20,428 observations. Note first that inclusion of sixteen independent variables in the equation eliminates almost two- thirds of the 61,676 undergraduate observations because of missing data on one or more of these variables. For example, as noted above, ten percent of all students did not indicate their ethnic background and hence they are eliminated from the statistical analysis. This introduces the possibility of some unknown selection bias. However, more than 20,000 observations remain, a very healthy number by past standards.

Second, observe that despite the fact that thirteen of the independent variables are statistically significant (two-tailed tests), Equation 4.1 explains only 15.5 percent of the variance in student grades (R2 = .155). In fact, the highest R2 reported in the three regressions found in Table 4 is .216. This is not unusual in large, diverse cross-sectional samples, which take a snapshot of individuals at a single moment in time and consequently often finds them in a disequilibrium situation. Even so, this result warns us that despite the statistical significance of the individual variables, there are many other relevant influences on student academic achievement that have not been included in the equation. One would expect, for example, that a student's work schedule and family responsibilities would influence his academic achievement. Further, Equation 4.1 does not account for differences in student abilities, academic background, motivation, or preferred learning styles.

TABLE - 4
REGRESSIONS OF STUDENT GRADES ON EXPLANATORY VARIABLES

Independent Variables	Estimated Coefficients (absolute value of t -statistics in parentheses)		
	Regression 4.1	Regression 4.2	Regression 4.3
CC	-.045 (2.13)**	-.066 (.76)	.018 (.60)
REGIONAL	-.065 (3.03)***	-.186 (2.83)***	.052 (1.49)
MAINCAMPUSTV	-.026 (.44)	.087 (.95)	.132 (1.08)
UNDERGRAD	-.498 (30.87)***	-.706 (10.40)***	-.510 (21.60)***
MALE	-.169 (10.16)***	-.215 (4.02)***	-.167 (4.56)***
AGE	.014 (17.65)***	.036 (6.00)***	.013 (9.99)***
ODUCRHOURS	.003 (8.26)***	.003 (5.23)***	.007 (10.61)***
TTNCOURSES	.019 (2.67)***	-.005 (.16)	.010 (.98)
AFRICANAMER	-.460 (20.27)***	-.430 (7.33)***	-.270 (7.40)***
ASIANAMER	-.046 (1.26)	-.107 (1.34)	-.083 (3.35)***
HSGPA		376 (8.36)***	
TRANSFERGPA			.351 (16.61***
DEPTGPA	.411 (20.06)***	.492 (7.45)***	.443 (14.12)***
FACAGE	.002 (2.58)**	.007 (2.78)***	.003 (2.26)**
FACTENURE	-.103 (6.72)***	-.115 (2.16)**	-.158 (6.68)***
FACMALE	-.091 (5.92)***	-.093 (1.72)*	-.043 (1.83)*
FACAFRAMER	.079 (2.61)**	-.367 (2.78)***	.095 (2.11)**
FACASIAN	-.033 (.87)	-.424 (4.47)***	-.182 (2.18)**
R^2 = F = Constant = Sample Size =	.155 233** 1.89 20,428	.173 28.6*** .581 2,345	.216 119*** .646 7,390

*** = statistically significant at the .01 level
** = statistically significant at the .05 level
* = statistically significant at the .10 level
(All two-tailed tests)

Nonetheless, with these caveats in mind, let's examine the regressions in Table 4. Our focus is on the variables that reflect ethnic background, gender and age. Those who are interested in a broader discussion involving other variables in the regression equation should examine Koch (2005). Many of the variables are specified as multiple category dummy variables.

where:

CC	Course taken at a community college site
REGIONAL	Course taken at a regional branch campus site
MAINCAMPUSTV	Course delivered from another site to the main campus via television
UNDERGRAD	Dummy variable. 1 = undergraduate
MALE	Dummy variable. 1 = male
AGE	Student's age
ODUCRHOURS	Previous ODU credit hours completed by student
TTNCOURSES	Previous TELETECHNET courses completed by student
AFRICANAMER	Dummy variable. 1 = African American student
ASIANAMER	Dummy variable. 1 = Asian or Asian American student
HSGPA	Student's high school grade point average
TRANSFERGPA	Student's grade point average at institution from which he/she transferred, if student did transfer
DEPTGPA	Mean undergraduate grade assigned by the department offering the student this course
FACAGE	Faculty member's age
FACTENURE	Dummy variable. 1 = faculty member is tenured
FACMALE	Dummy variable. 1 = faculty member is male
FACAFRAMER	Dummy variable. 1 = faculty member is African American
FACASIAN	Dummy variable. 1 = faculty member is Asian or Asian American.

- The performance of male distance learning students is noticeably inferior to that of females. *Ceteris paribus,* men earn a grade that is .169 lower than women in Regression 4.1, .215 lower in Regression 4.2, and .167 lower in Regression 4.3. The 1999-2000 National Center for Education Statistics study of American undergraduates found a similar grade pattern (NCES, 2002) and some regard this as a major societal problem. A portion of this difference could reflect differences in disciplines and course selection, though all three equations include a control variable that represents the mean grade assigned in the department offering the course. The reality is that at Old Dominion University, a disproportionate number of women are distance learning students (about two-thirds of all TELETECHNET students). Is there something about distance learning in general, or the nature of the lives of men and women, that makes it less attractive to men, but more attractive to women? Enrolment numbers do not necessarily indicate this. Nationally, 55.8 percent of undergraduate distance learning students were women in 1999-2000 (NCES, 2002). This is slightly lower than the percent of women in higher education overall. Still, is there something about the specific interactive television model of distance learning that makes it an especially productive venue for women? Or, instead, are the male distance learning students simply less talented, or less motivated, or less disciplined, and therefore less likely to apply themselves? At least one previous study suggests exactly this. Oxford, et. al., (1993) found motivation was the single most important predictor of student success and that women students were more motivated than men students. Of course, it also could be possible that men have more difficult work and family responsibilities than women, though women with children might easily demur. We cannot pin point the answer here, but note

that these are provocative subjects that have been discussed before. See Whittington (1995) and Koch (1998) for summaries of often conflicting evidence and Taplin and Jegede (2001) for a recent empirical study of 712 distance education students at the Open University of Hong Kong that focused on gender differences in student learning styles and backgrounds.

- The older the student, the better grade he/she is likely to earn. This is not a new finding (see Dille and Mezack, 1991, for an example). Specifically, a student who is ten years older than the average will earn a grade that is .14 higher (Regression 4.1). In the two other regression specifications, this advantage ranges from .13 to .36. Maturity appears to confer advantages to distance learning students who sometimes must be self motivated (Bisciglia and Monk-Turner, 2002) and cannot always count upon peer support. This is consistent with the findings of the NCES (2002) study of American undergraduates (both bricks and mortar and distance learning) in 1999-2000, which found that 42.6 percent of undergraduates aged 18 or younger earned mostly C's and D's, or lower, while only 23.1 percent of undergraduates aged 30-39 did the same.
- African-American students earn noticeably lower grades than Asian and Asian-American students, who in turn earn lower grades than white students (who are the excluded category). We will examine this finding in greater detail in a moment. These differentials could be due to lower academic qualifications, intentional or unintentional discrimination, differing group personal characteristics such as work schedules and family responsibilities, and/or a lack of comfort on the part of individual minority students with this distance learning setting.

Before returning to the question of minority student performance, I should note that quantitatively, the single most important determinant of a student's grade is the identity of the department in which the student is taking the course. The DEPTGPA variable is large and statistically significant and accounts for .411 to .492 of a student's grade in the three regression specifications. This reflects the reality that, for example, economists and engineers grade their students differently than sociologists and musicians.

Let's now return to the matter of the achievement of minority students. As Equation 4.1 indicates, ceteris paribus, that African-American students are assigned a grade .460 lower than white students, while Asian- and Asian-American students are assigned a grade .046 lower than white students (though this estimate is not statistically significant). Four rough and ready hypotheses are offered here for consideration with respect to these findings:

- Minority students are less well prepared academically.
- Minority students are subjected to intentional and unintentional discrimination.
- Minority students have non-classroom characteristics (work schedules, family responsibilities, and the like) that impose demands upon them that white students do not experience.
- Minority students are not as comfortable as majority, white students in distance learning situations because they are not included as often in study groups, chat room conversations, and bull sessions where learning may occur.

Let's consider each of these hypotheses in turn. Are minority students less well prepared than majority, white students in the United States? This is a hypothesis advanced by many (Shoichet, 2002) after the 1999-2000 NCES study (NCES, 2002) reported that 48.9 percent of African-American undergraduate students earned "C's and D's, or lower," while only 32.2 percent of Asians and Asian Americans, and 30.3 percent of whites earned

similar grades. Academic qualifications are difficult to assess and the problems associated with standardized test scores have been debated fiercely. Further, it is difficult to separate native intellectual ability from motivation and drive. Most problematic, however, is the lack of availability of personal academic preparation and performance data on most of the distance learning students in this sample. However, for a reasonable group of students (2,345), their high school grade point average is available, along with all other necessary data points. One reason so few observations are available is that nearly all TELETECHNET undergraduate students enter the program having already earned an associate degree. In addition, their average age is 32.6. Hence, Old Dominion does not place emphasis on retrieving the high school performance of these mature transfer distance learning students. The institution believes other personal characteristics are far better predictors of success.

In Equation 4.2, the high school grade point average (HSGPA) of distance learning students is included as an argument. Otherwise, Equation 4.2 is a duplicate of Equation 4.1. One can see that the coefficient of the HSGPA variable is highly significant and quantitatively important. Holding other things constant, we predict that a student who has earned a 3.0 (B) average in high school rather than a 2.0 (C) average will earn a distance learning grade that is .376 higher. High school grades, then, tell us quite a bit. To the extent that high school grades reflect the ability and motivation of the typical distance learning student who is in his 30s, then they are a useful predictor variable. Note that when HSGPA is included, the coefficient of the African-American variable becomes less negative and changes, but only a bit, from -.460 to .430. However, the comparable coefficient for Asian-Americans changes from -.046 to -.107, but again is not statistically significant.

Individuals from various ethnic groups may enter TELETECHNET with differing academic preparations and perhaps even differing levels of motivation. However, the HSGPA variable is at best an imperfect measure of such things, not the least because of the almost 15-year gap between the typical student's high school graduation date and her distance learning activities. Hence, while there is a bit of empirical support for our first hypothesis, this evidence does not permit a strong confirmation.

There is another, perhaps more relevant test of this hypothesis that is available. Since nearly all TELETECHNET students transfer into the institution with at least two years of college credit, it is possible to determine a transfer grade point average (TRANSFERGPA) for many of them upon their entry into Old Dominion. A total of 7,390 such observations are available. Equation 4.3 reports a regression for these students (all of whom took their courses at a community college site) that includes the TRANSFERGPA variable. TRANSFERGPA is a highly significant argument in the equation. It produces a significant increase in R2 and a very high t-statistic. Ceteris paribus, a student who enters with a B average = 3.0 TRANSFERGPA rather than a C-average (2.0) will earn a predicted grade that is fully .351 higher. While the TRANSFERGPA also is an imperfect measure of academic preparation and motivation, this result suggests that previous academic performance is important in distance learning. This is hardly surprising, though at least one previous study (de Freitas and Lynch, 1986) found that previous academic performance had no effect on the subsequent academic performance of non-traditional students.

When the transfer grades are considered, the coefficient on the African-American variable changes from -.460 to -.270, though the Asian-American coefficient moves a bit in the opposite direction, from -.046 to -.083. All other variables maintain their expected relationships.

Given the imperfect measurement of academic preparation (and perhaps motivation) by the HSGPA and TRANSFERGPA variables, we can conclude only that the evidence suggests that differing levels of academic preparation and motivation among the three ethnic groups appear to be important. More precise measures would enable a more definitive test of this hypothesis.

This brings us to the possibility of discrimination, intentional or unintentional. To discriminate against minority students, distance learning faculty must know who these people are. Therein is the rub. In Old Dominion's distance learning system, in nearly all cases, faculty members cannot see their students. Hence, unless subtly tipped off in other ways, faculty do not know the ethnic background of the students they are teaching. Of course, it is possible for faculty to discern the ethnic background of their students in other ways, for example, perhaps by listening to their speech, from their names, or even by the nature of their writing topics and word choices. However, the mean size of a TELETECHNET course is about 100 students and just as in a comparable bricks and mortar situation, most students do not ever choose to speak in class. Arguably, this could be particularly true for minority students who sit in a classroom dominated by majority students. If so, then this means that their faculty members frequently will be clueless with respect to their ethnic identity.

If distance learning students tip off their ethnic identity in other ways, for example, through their names or the examples they use in their writing, then the discrimination hypothesis requires that distance learning faculty (who are almost 87 percent white) take this information and act upon it, either consciously or unconsciously. Yet, distance learning administrators report a virtual absence of ethnic or racial complaints from distance learning students. Further, minority enrollment, particularly among African-American students, has been strong and growing at Old Dominion, both on campus and in distance learning and has more than doubled during the past decade while the University's enrollment increased about 25 percent. Of course, this evidence does not by itself defeat any version of the discrimination hypothesis, but it is important background information.

What can we say about the hypothesis that the various ethnic groups may have differing non-academic characteristics, for example, differing work schedules, family responsibilities, and the like? Not much. We cannot address this class of hypotheses with this data set. It seems reasonable that the non-academic personal lives of students will influence their academic performance (see Whittington, 1995, for a survey of the evidence). The 1999-2000 NCES study (NCES, 2000) of American undergraduates found that minority undergraduate students (especially African American) were more likely to be characterized by one of nine "risk factors" that NCES believes contribute to lower academic performance and drop outs. NCES cites risk factors such as a student having dependents of children, being a single parent, working full time, and so forth. The mean white student reported 2.0 such risk factors, while the mean African-American student reported 2.7 such risk factors (NCES, 2002). Against this, it should be noted that the NCES study also found that women undergraduate students had more risk factors than men (2.2 versus 2.1, on average), yet excel men students in terms of grade point average. Clearly, the determinants of academic success are complex.

Finally, what can we say with respect to the "comfort" hypothesis? Are minority students less comfortable when they do Old Dominion's distance learning because they may be one of only a few minority students at a distance learning site? Perhaps minority students are not included as often in study groups, chat room discussions, or ordinary out of class bull sessions where learning may

occur. Of course, this is speculation and it is impossible to know the extent to which this could be true. Further, distance learning often is "sold" as a mode of learning that makes gender, race, and national origin irrelevant. The results reported here, which could be idiosyncratic to Old Dominion, nevertheless suggest at least the possibility that this view could be faulty.

More than one in six distance learning students at Old Dominion reports he is a member of a minority group. The actual proportion could be larger because ten percent of students chose not to record their ethnic identity. Perhaps minority students have a greater tendency to decline ethnic or racial identification. Thus, while it is true that faculty cannot see their distance learning students, the students at particular sites can see each other, and perhaps they act negatively based upon what they see. If so, then the result could be a chilled classroom atmosphere for minority students.

That said, other available evidence makes this proposition problematic. The student satisfaction surveys collected by the institution both during and at the completion of every distance learning class do not reveal the existence of such feelings or problems. Additionally, minority students apparently have been voting with their feet in favor of this distance learning model. Such data hardly destroy racial discrimination hypotheses, but do render them suspect.

What, then, can we say about the causes of the gender and ethnic grade differentials reported in Table 4? Needless to say, they are interesting and we need to know more why these differentials exist and, to the extent the differentials are remediable, devise palliatives. Perhaps these differentials would be erased if we had available sufficiently detailed personal information on individual students, including measures of academic preparations, native intellectual ability, motivation, detailed indicators of work and family responsibilities, and financial data. This is a fertile area for future research.

FINAL COMMENTS

This work reported here clearly does not represent a final and definitive statement about the determinants of student success in distance learning. It focuses on actual student grade achievement and not upon student ratings and preferences. Similarly, this study neither examines the personality characteristics of distance education students (for example, see Biner, et. al., 1995), nor does it examine the determinants of student persistence. What this study does contribute, however, is considerable new information about the academic success of distance learning students. It also deals with many, but not all, of the deficiencies Machtmes and Asher (2000) found in previous empirical studies. Among the most important of these deficiencies addressed here are: (1) the absence of a genuine control group of students who took the identical course from the same faculty member; and, (2) very small experimental samples that generate only anecdotal conclusions.

Decision makers at many different levels would benefit from additional large sample studies of the type reported here. Only then will we be able to infer whether the results reported here are idiosyncratic to Old Dominion University, or whether they can be easily generalized to other varieties of distance learning. The perils associated with strong policy conclusions based upon the statistical significance of coefficients in single regression equations are well-known, but not always heeded. We should pay more attention to repetitive results confirmed in appropriately rigorous testing circumstances than results, however strong, that emanate from a single study.

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