ED 431 356   HE 032 121

AUTHOR   DesJardins, Stephen L.; Pontiff, Harry
TITLE   Tracking Institutional Leavers: An Application.
INSTITUTION   Association for Institutional Research.
PUB DATE   1999-00-00
NOTE   16p.
AVAILABLE FROM Association for Institutional Research, 114 Stone Bldg.,
                Florida State University, Tallahassee, FL 32306-4462.
PUB TYPE   Collected Works - Serials (022) -- Reports - Research (143)
JOURNAL CIT   AIR Professional File; n71 Spr 1999
EDRS PRICE   EDRS Price MF01 Plus Postage. PC Not Available from EDRS.
DESCRIPTORS   Academic Persistence; College Outcomes Assessment;
                Databases; *Dropout Research; *Dropouts; Followup Studies;
                Higher Education; Research Methodology; State Programs;
                Student Characteristics
IDENTIFIERS   *University of Minnesota Twin Cities

ABSTRACT
                This study attempted to track students (n=2,077) who entered
the University of Minnesota (Twin Cities campus) in 1986 but had not
completed a degree at that institution within eight years of matriculation.
The study utilized the Minnesota Higher Education Services Office's statewide
database which allowed researchers to determine if, when, and where these
students had reenrolled within Minnesota's higher education system.
Characteristics and patterns of "stayers" and "leavers" were compared. The
study found that 60 percent of leavers did so during their first two years;
students who left later often had grade point averages below those needed to
transfer to preferred upper division units. Although leavers generally had
demographic characteristics similar to stayers, leavers were more likely to
have had low entrance test scores and high school rank percentiles; early
leavers who reenrolled in a state institution were likely to enroll at a
community college or vocational/technical institution, but students who left
after three or four years overwhelmingly chose four-year institutions. About
63 percent of leavers eventually attained senior status in a four-year
institution or attended a vocational/technical college long enough to
complete a program. Nine tables present details of the study's findings.
Policy implications of the findings and the use of statewide tracking systems
are discussed. (Contains 13 references.) (DB)

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Professional File

The Association for Institutional Research
for Management Research, Policy Analysis, and Planning

Number 71 Spring, 1999

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Abstract

For a variety of reasons, many institutions of higher education have never systematically tracked students who leave institutions before completing a degree. Often times these institutional leavers reenroll in another higher education institution. In this study, we tracked University of Minnesota students who left the institution. Using the Minnesota Higher Education Services Office's statewide database, we tracked institutional leavers allowing us to determine if, when, and where these students reenrolled within Minnesota's higher education system. The ability to track and analyze these students has policy implications for higher education in general and individual institutions like the University of Minnesota.

Introduction

The exercise of tracking students beyond the walls of the matriculating institution has gained importance since the issuance of the final rules of the Student Right to Know and Campus Security Act (SRK) and the imposition of the IPEDS Graduation Rate Survey (GRS). SRK regulations require an institution that participates in any student financial assistance program under Title IV of the Higher Education Act of 1965, as amended, to disclose information about graduation or completion rates to current and prospective students. For many institutions the vehicle for complying with SRK requirements is the newly created GRS.

In response to practical concerns of tracking students after they leave an institution, the SRK requires the reporting of the rate at which students complete or graduate; and ask for voluntary reporting of *the rate at which students transfer out of an institution.* The regulations specify that first compliance will not be required until 150 percent of normal time-to-completion has expired for the first cohort (entering fall 1996). The implementation of the new IPEDS GRS, however, makes preparing to track students who "transfer-out" even more immediate.

The final rules of SRK specify that transfer-out may be documented in several ways, including "Confirmation of enrollment data from a legally-authorized statewide or regional tracking system (or shared information from those systems) confirming that a student has enrolled in another institution" (34 CFR §668.8(c)(2)(iii)). Even though statewide databases now exist in many states, some institutions of higher education do not routinely track information about their leavers who reenroll in other institutions. Similarly, although institutions may prepare internal reports on tracking students outside of their institution, there are few public studies documenting when leavers return to higher education and where these students decide to attend. For readers not familiar with this line of research, our paper is offered as an example of how an institution can use a statewide tracking system and the potential benefits of doing so.

Presented below is a brief review of the literature, a discussion of how the data used in this study were accumulated, and descriptive comparisons of the characteristics of students who remained in the University of Minnesota and students who left. In addition, we examine the temporal dimensions of student leaving behavior and provide a description of where institutional leavers who later reenroll in other Minnesota institutions of higher education were likely to end up. In the final

section a brief discussion of the limitations and policy implications of this research is also presented.

The History of Student Tracking and a Review of the Literature

Multi-institution, unit record, statewide databases emerged with the advent of statewide higher education agencies in the 1960s and 1970s (Russell and Chisholm, 1995). Over time, the number of states having these databases has increased to where most states now have some form of statewide tracking mechanism in place. "Tracking transfer students—a relatively new concept— is now possible in thirty-four states, and only one state with a unit-record data base does not intend to develop this capacity" (Russell and Chisholm, 1995, p. 47). Originally, these databases were mainly used to collect and report on enrollment, completion, and financial information. Due to increased demands for information by oversight agencies and the general public, however, the structure and functionality of these data systems have evolved. Functionally, many of these systems have been augmented to include the capability to report on applications, courses, student performance, and post-college outcomes. Typically, these databases are now "more inclusive in terms of the number of institutions and sectors included and the frequency of data collection" (Russell and Chisholm, 1995, p. 45) and are therefore more amenable to longitudinal analyses. The reasons for these changes are (generally) an increased interest in accountability, with specific attention focused on student graduation rates and their labor market outcomes. The accountability movement has sparked legislation like SRK that has made it necessary for states to utilize the capacity to track students beyond the walls of single institutions.

To date, there have been a number of articles and books written on how to develop student-tracking systems (Ewell, Parker, and Jones, 1988; Bers, 1989; Middaugh, 1992; Ewell, 1995). There have been, however, fewer articles detailing how to effectively use these systems for reporting and policy research purposes (for an exception see Lavin, et al., 1997). For a more complete review of the literature on student tracking see Palmer (1990).

The Sample, Methodology, and Hypotheses

The original sample consisted of 5,022 students who entered the University of Minnesota (Twin Cities campus only) as New High School (NHS) students in the fall term of 1986. Using an institutional database designed for retention reporting and research, the 1986 cohort was tracked retrospectively to determine whether, and if so when, a student had left the institution before completing a degree (henceforth "leavers") within eight years of matriculation. Also identified were students who remained

enrolled or had graduated (within eight years) from the study institution (henceforth "stayers"). The retention database also houses a variety of background, demographic, and academic performance information. Some of this information was included in the data file so that we could analyze differences between stayers and leavers along particularly important dimensions.

A critical piece of information that is available in the retention database is the student's social security number. This variable provided the link between the University of Minnesota data and the Minnesota Higher Education Services Office (HESO) statewide database, thereby allowing us to track institutional leavers outside the University of Minnesota system. HESO houses, and is responsible for, Minnesota's authorized statewide tracking database. This database contains enrollment information for the entire Minnesota higher education system. In the past, HESO analysts have used this database to track enrollments, do reports of the financial condition of Minnesota's higher education institutions, and inform institutional and legislative policymakers. The statewide database has seldom been used to track an institution's leavers for purposes of establishing whether these students enrolled in another institution within Minnesota, and if they did, when and where they enrolled.

Using HESO's database, University of Minnesota leavers were tracked in order to determine whether, and if so when, they enrolled in another higher education institution after exiting the Twin Cities campus. Since the Minnesota Data Privacy Act, the strictest such law in the country, forbids sharing of statewide unit-record data with institutions, only summary data on institutional leavers was shared with the institution. Nonetheless, because of a close working relationship between the University of Minnesota institutional research staff and HESO analysts we were able to obtain the information needed to conduct this analysis.

Procedurally, our intentions were to 1) demonstrate to our colleagues within and outside of Minnesota how this tracking could be done, 2) demonstrate to institutional and state policymakers the usefulness of such an endeavor, and 3) to provide better information on student outcomes to educational policymakers within Minnesota. The focus of the descriptive analysis conducted was 1) to determine if University of Minnesota leavers reenrolled in another higher education institution within Minnesota, 2) for leavers who did reenroll, to examine if the timing of their departure was related to their propensity to reenroll, and 3) to examine whether there were temporal differences in the type of institution in which leavers reenrolled. For example, students who left the University of Minnesota early in their academic careers may be underprepared students, and if so, may tend to reenroll in two-year programs at community colleges to upgrade their skills. Conversely, early leavers may be high ability

students who are not challenged by the academic demands of the University and decide to transfer to another institution. Early leavers may also be students who find that higher education is not appropriate for them and leave higher education to pursue other non-academic endeavors.

University of Minnesota students who left the institution late in their academic careers may have done so because of an inability to gain admission to their preferred upper division program. If this is the case, these students may decide to enroll in another four-year degree granting institution to complete their studies. Also, it has been suggested that economic considerations may cause some students to do their lower division study at the relatively inexpensive University of Minnesota and then transfer to a private four-year institution to obtain their degree. The rationale for such behavior may be the anticipation of increased labor market returns by having a degree from a private institution.

Characteristics and Patterns of Stayers and Leavers

In this section we provide descriptive information about the sample used. Presented are similarities and differences between fall 1986 matriculants (N=5022), stayers (N=2945), and institutional leavers (N=2077). Figure 1 provides a profile of stayers and leavers by their original home location. As shown in Figure 1, the distribution of stayers and leavers by home location is very similar ("Reciprocity" students are from Wisconsin, North and South Dakota; states that have tuition reciprocity agreements with Minnesota).

Figure 1
#### Profile of Stayers and Leavers by Original Home Location
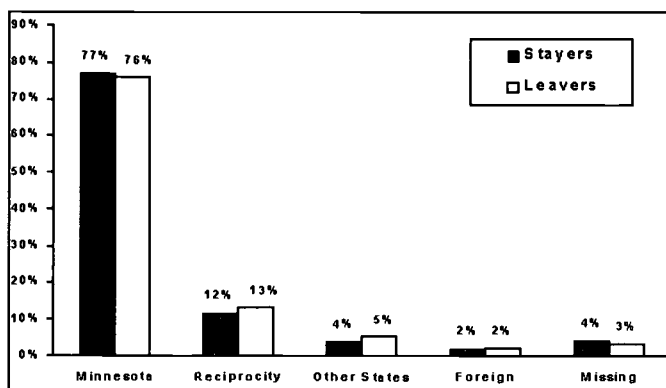
Figure 2 provides information about the distribution of stayers and leavers by initial college of enrollment. College of Liberal Arts (CLA) students accounted for 60 percent of 1986 freshman enrollments, 62 percent of stayers, but

only 57 percent of leavers. Institute of Technology (IT) students accounted for 19 percent of matriculants, 24 percent of stayers, but only 12 percent of leavers. General College (GC) accounted for 17 percent of matriculants, only 10 percent of stayers, and 28 percent of leavers. There was no difference in the distribution of matriculants, stayers, and leavers in the colleges located on the St. Paul campus (Agriculture, Natural Resources, and Human Ecology). It could be argued that the college a student was enrolled in upon *leaving* the University is a more appropriate gauge of collegiate differences in leaving behavior. We also analyzed collegiate differences in leaving behavior using this alternative definition and found a pattern very similar to the one shown in Figure 2.

Figure 2
Profile of Stayers and Leavers by Initial College of Enrollment
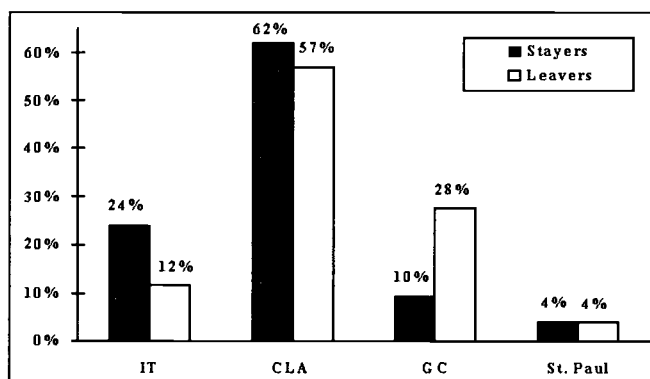
Ethnic differences between stayers and leavers are presented in Figure 3. Leavers' ethnic distribution is slightly different than that of stayers with stayers being more likely to be white and leavers more likely to be from underrepresented minority groups.

Figure 3
#### Profile of Stayers and Leavers by Ethnicity
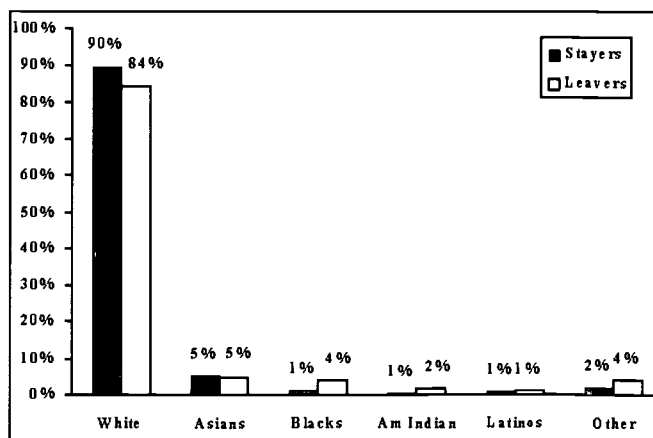
Figure 4 describes the differences between matriculants and leavers based on high school rank percentile (HSR%). Students with low HSR% (below the 50th percentile) constitute a disproportionate share of leavers while students in the 50th to 74th percentile range have leaving rates slightly higher than students who remained enrolled at the study institution. Top quartile students accounted for 47 percent of all matriculants, 57 percent of stayers, but only 34 percent of leavers. Students with missing HSR% were included because institutional policymakers have long been interested in how students admitted without this measure (and other admissions-related criteria) fare in their academic endeavors.

Figure 4
Profile of Stayers and Leavers by
High School Rank Percentile
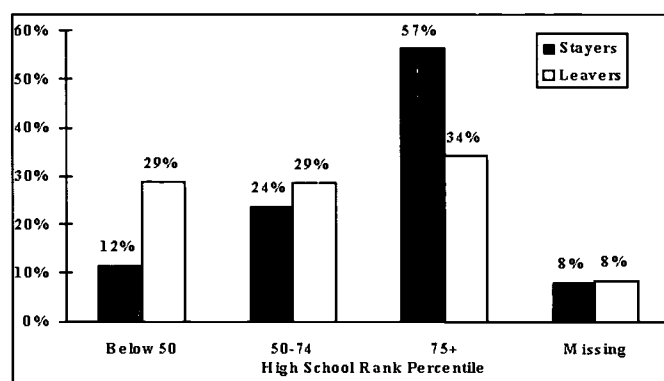
Figure 5 indicates that students with low ACT Composite test scores are more likely to leave than their higher scoring counterparts. This graph provides slightly more detail about the role of academic ability than Figure 4 does, and indicates that students with ACT scores below the average of the entering class (about 22) account for a disproportionate share of University of Minnesota leavers. Masked by this graphic are the high rates of leaving by students with very low ACT scores. For
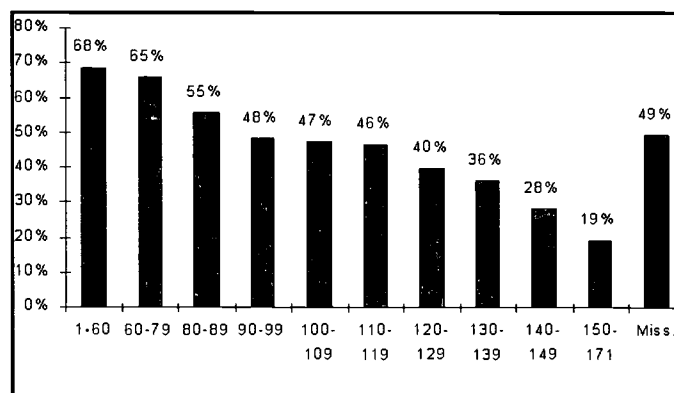
Figure 5
Profile of Stayers and Leavers by ACT Score
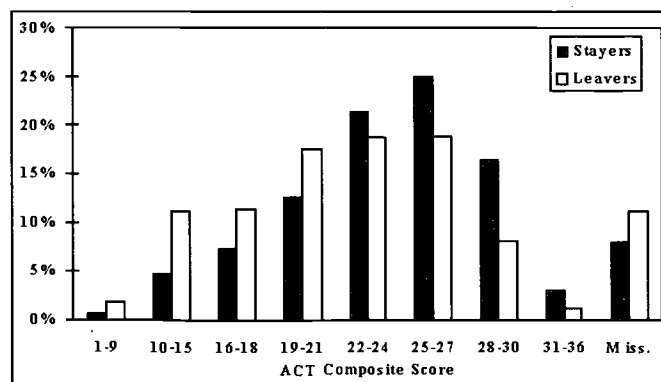
instance, of the 58 students with ACT scores in the 1 to 9 range, 67 percent of them exited the institution before earning a degree. Conversely, all 7 students with ACT scores in the 34 to 36 range graduated from the institution.

The University of Minnesota uses an index of ACT Composite and HSR% to help guide admissions decisions. Known as the Application Aptitude Rating (AAR), this index is defined as ((2*ACT Composite score) + HSR%). Another way to examine the relationship between measures used as enrollment criteria (i.e., ACT Score, HSR%, or AAR) and leaving behavior is to focus on the "leaving rate" (percent of matriculants who leave). Because of the important role AAR plays in admission's policy at the study institution, Figure 6 is provided. As expected, there is an inverse relationship between AAR score and leaving before degree completion. Over two-thirds of the 180 students who matriculated with AAR scores in the lowest category (1-60) exited the institution before degree completion. About 63 percent of all students enrolled with AAR scores below 90 (a floor often used for reviewing applicants) left the University without attaining a degree.

Figure 6
Proportion of Matriculants Who Leave by AAR
Index Focusing on Leavers

The analysis presented in this section focuses on University of Minnesota leavers and the temporal patterns of their departure. As mentioned above, of the 5022 students who matriculated to the University of Minnesota in the fall of 1986, 41 percent (or 2077) of them left the institution before receiving a degree. Figure 7 provides information about the timing of these students' leaving behavior. About 34 percent (or 715) of all University leavers did so after spending all or part of one-year enrolled. Over 26 percent of leavers exited the institution after being enrolled for two years at the study institution. Thus, about 60 percent (34% after year one + 26% after year two) of all leavers departed the institution within two years of matriculation. Rather surprising is the number of students who decided to leave the University after

spending four or more years at the study institution. About one-quarter of all leavers did so after being enrolled for four years or more.

Figure 7
Temporal Profile of Leavers
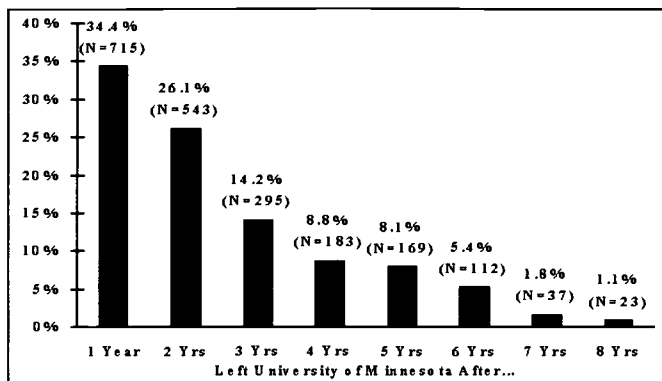
Figure 8 details the academic performance of leavers while they were enrolled at the University of Minnesota. Students who left the University after one year were poor academic performers. These students had a mean grade point average of 1.77, below acceptable levels for most colleges that admit lower division students at the study institution. These students would certainly have been put on academic probation and would be likely candidates for academic dismissal. Students who left the University later in their academic careers (after three years) had grade point averages above 2.30. Since students performing at levels lower than 2.00 would probably not have survived for three years, this result is not surprising.

Figure 8
Mean Grade Point Average of Leavers by Time of Exit
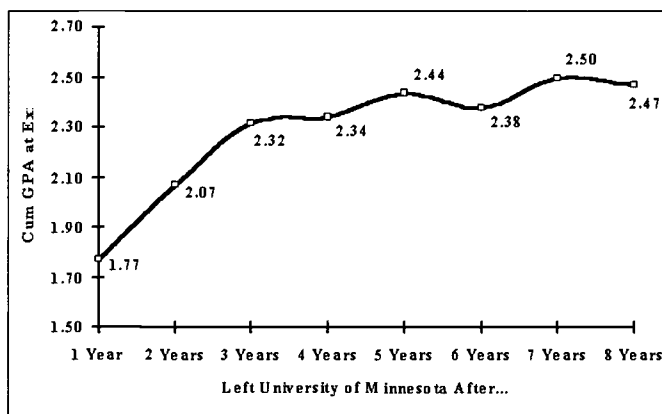
Table 1 is offered to provide even more detail about the differences in performance by collegiate unit of matriculation. As noted above, students who exited the

University after one year are either unwilling or unable to perform at levels required by their respective colleges. The highest mean grade point average for first-year leavers is in IT (1.98) and this level of performance is surprisingly poor for a college with very high academic standards. Academic performance at this level, over an entire academic year, would certainly land a student on the probation rolls and would probably lead to academic dismissal.

Table 1
Mean Grade Point Averages of Leavers by Initial College of Enrollment

Left After...	Institute of Technology	College of Liberal Arts	General College	St. Paul
1 Year	1.98	1.81	1.64	1.75
2 Years	2.05	2.13	1.97	2.09
3 Years	2.29	2.38	2.19	2.34
4 Years	2.40	2.44	2.15	2.30
5 Years	2.34	2.52	2.25	2.29
6 Years	2.58	2.38	2.21	2.26

Years seven and eight were excluded because of small sample sizes

Focusing on Leavers Who Enrolled Elsewhere

We now shift our focus to students who left the University but ended up enrolling in another higher education institution in Minnesota by fall of 1994. Table 2 presents the results of this retrospective tracking of leavers. We found that of the 715 students who matriculated in fall of 1986 and left the University of Minnesota after one year (by fall 1987), 24 percent (or 175) of them were enrolled in another Minnesota institution the very next fall (1987). Table 2 also provides information about the statewide enrollment rates of first-year leavers through the fall of 1994. For instance, in the fall of 1988 about 26 percent of the University's first-year leavers were enrolled in another institution of higher education in the state of Minnesota. The two-percent differential between the reenrollment rate for 1987 (24%) and the rate for 1988 (26%) indicates that some students delayed college reentry by a year. This pattern of reenrollment is quite consistent for students who exited the University after years one through four, however, the pattern changes for students who left the University after five years of enrollment. Even though 169 students exited the University after five years of enrollment, only

Table 2
Reenrollment Patterns of Leavers

Left After...	Total	1987 N %	1988 N %	1989 N %	1990 N %	1991 N %	1992 N %	1993 N %	1994 N %
Year 1	715	175 24%	189 26%	154 22%	122 17%	86 12%	56 8%	49 7%	49 7%
Year 2	543		149 27%	159 29%	116 21%	75 14%	47 9%	42 8%	33 6%
Year 3	295			74 25%	81 27%	52 18%	49 17%	29 10%	22 7%
Year 4	183				40 22%	48 26%	37 20%	23 13%	17 9%
Year 5	169					17 10%	17 10%	13 8%	5 3%
Year 6	112							5 4%	
Year 7	37							2 5%	
Year 8	23								

17 (or 10%) of these students were enrolled in another institution of higher education within Minnesota in the fall of 1991 (the fall after leaving the University).

Table 3 provides cumulative enrollment statistics on where students were enrolled in Minnesota's higher education system after leaving the University of Minnesota. After one year of enrollment, 175 students left the study institution and reenrolled in another institution the very next fall (1987). About 41 percent of these first-year leavers were enrolled in a community college, roughly 21 percent enrolled in a state university, about 15 percent decided to attend one of Minnesota's private colleges, and about 24 percent reenrolled in a private vocational or technical college. This result indicates that most (65%) first-year leavers who were reenrolled in college in fall 1987 chose a community college or vocational/technical institution.

In the fall of 1988, about 27 percent (or 338) of the 1258 students who left the University after years one and two (715 and 543 respectively, see Table 2) were enrolled in another Minnesota institution of higher education. Table 3 displays the distribution of these students by institution type and the pattern is quite similar to that of students who left the study institution after one year and enrolled in another higher education institution by fall of 1987.

As noted in Table 3, the higher education system that students reenroll in changes over time. By 1989 only 22 percent of all leavers who reenrolled somewhere in Minnesota's higher education system were enrolled in the community college system, whereas the private college system accounted for about 23 percent of leavers. This shift in the sectorial distribution of students is caused by 1) students who reenrolled in the community college/vocational-technical system finishing their degrees or programs and exiting the higher education system, and 2) students who leave the University of Minnesota after three years having higher probabilities of enrolling in the state or private college systems. Leavers who initially reenrolled in two-year institutions (community colleges and vocational/technical schools) but then switched to four-year institutions after one or two years in the community college system could also be contributing to the change in the enrollment distribution by sector.

In order to provide more detail about the time dimension of the results displayed in Table 3 we present Tables 4-

Table 3
Cummulative Reenrollment Patters of Leavers by Educational System

System	1987 (N=175)	1988 (N=338)	1989 (N=387)	1990 (N=359)	1991 (N=278)	1992 (N=214)	1993 (N=163)	1994 (N=135)
Community College	41%	37%	22%	16%	23%	22%	23%	29%
State University	21%	24%	31%	37%	36%	32%	35%	30%
Private College	15%	17%	23%	28%	24%	24%	22%	28%
Voc/Tech	24%	23%	24%	19%	16%	21%	18%	9%

Table 4
Reenrollment Paterns of First-Year Leavers by Educational System

System	1987 (N=175)	1988 (N=189)	1989 (N=154)	1990 (N=122)	1991 (N=86)	1992 (N=56)	1993 (N=49)	1994 (N=49)
Community College	41%	43%	27%	21%	31%	29%	22%	39%
State University	21%	21%	32%	39%	35%	34%	35%	22%
Private College	15%	15%	21%	25%	20%	20%	22%	27%
Voc/Tech	24%	21%	20%	16%	14%	16%	18%	10%

7. Table 4 focuses specifically on the enrollment patterns of students who left the University of Minnesota after one year of enrollment. As noted above, students who departed the University after one year and reenrolled the very next fall (1987) are differentially distributed among Minnesota's higher education systems. First-year leavers are more likely to be enrolled in a community college than students who left after their first year. Also, we were able to determine that of the first-year leavers who enrolled in a community college a year after leaving the University of Minnesota, 75 percent were studying at a community college located in the Twin Cities metropolitan area (not displayed). Similarly, first-year leavers who enrolled in a state university or private college a year after leaving the study institution were also likely to have remained in the Twin Cities metropolitan area. This analysis indicates that the majority of students who left the University of Minnesota after one year and enrolled in another institution the very next fall were likely to continue their studies in institutions located within the seven-county Twin Cities metropolitan area.

Table 5 provides evidence that students who left the University of Minnesota two years after matriculation have reenrollment patterns different than students who exited after one year of enrollment. Students who left the study institution after two years of enrollment and immediately continued their studies at another institution were less likely to be enrolled in the community college

system than first-year leavers who enrolled the very next fall (28% for the former and 41% for the latter). Second-year leavers were more likely to be enrolled in state universities and private colleges than their first-year leaving counterparts. However, students who left the University of Minnesota after two years and enrolled in a community college tended to choose the same four metropolitan-area institutions as students who left after one year (not displayed).

Reenrollment patterns of University of Minnesota students who left after three years (presented in Table 6) are significantly different than the patterns of first- and second-year leavers noted above. Students who departed after three years of University of Minnesota enrollment are over twice as likely to reenroll in private four-year institutions as their first- and second-year leaver colleagues. By 1990, about 68 percent of third-year leavers are enrolled in the state or private college system, presumably indicating a desire to pursue a four-year degree.

A few students who left the University after three years of enrollment transferred out to community colleges or vocational/technical institutions. We were puzzled why students who have spent this much time at the University of Minnesota would reenroll in these systems. It was conjectured that these students may have enrolled at the University only part-time and did not accumulate many degree credits and therefore were not heavily "invested" in the University. On closer examination, however, it was

Table 5
Reenrollment Paterns of First-Year Leavers by Educational System

System	1988 (N=149)	1989 (N=159)	1990 (N=116)	1991 (N=75)	1992 (N=47)	1993 (N=42)	1994 (N=33)
Community College	28%	20%	15%	23%	28%	31%	21%
State University	29%	33%	40%	35%	28%	24%	27%
Private College	18%	19%	21%	21%	19%	14%	42%
Voc/Tech	25%	28%	25%	21%	23%	29%	6%

Table 6
Reenrollment Patterns of Third-Year Leavers by Educational System

System	1988 (N=149)	1989 (N=159)	1990 (N=116)	1991 (N=75)	1992 (N=47)	1993 (N=42)	1994 (N=33)
Community College	28%	20%	15%	23%	28%	31%	21%
State University	29%	33%	40%	35%	28%	24%	27%
Private College	18%	19%	21%	21%	19%	14%	42%
Voc/Tech	25%	28%	25%	21%	23%	29%	6%

discovered that these students had earned a substantial number of degree credits. The 12 students who left after three years and enrolled in the community college system in 1989 had an average of 78-degree credits. The 8 students enrolled in the technical college system had (on average) 84-degree credits, and the 8 students who decided to attend a private vocational school had amassed nearly 74-degree credits. Thus, these students had progressed about one-half the way toward a bachelor's degree in the three years they were enrolled at the University. As a reviewer of this paper commented, this pattern may be increasingly common as community colleges and vocational/technical institutions provide the technical training in information systems, health sciences, and other high demand fields. Apparently it is not unusual for 10 percent of students enrolled in community colleges to already have baccalaureate degrees, so the type of institution-switching behavior noted above should not surprise us.

Table 7 provides the same type of analyses described above, but for students who left the University after being enrolled for some portion of four academic years. As expected, very few of these students reenrolled in a community college, private vocational or technical institution. Like their counterparts who leave the University after three years, these students tended to reenroll in four-year degree granting institutions. The type of analysis presented in Tables 4-7 was not conducted for students who left the University after five years or longer as small sample sizes made any generalizations difficult.

Table 7
Reenrollment Patterns of Fourth-Year Leavers by Educational System

1986 Entering Cohort Graduation Rate			
Status	Reported	Adjusted	Difference
4 Years After Entry	8.3%	10.2%	1.9%
5 Years After Entry	28.8%	29.5%	0.7%
6 Years After Entry	38.9%	39.5%	0.6%
7 Years After Entry	43.2%	43.3%	0.1%
8 Years After Entry	45.0%	45.2%	0.2%

Leavers' Progress Toward Degree

Since conducting the analysis done in this paper, HESO has added information on system-wide graduates to its database. Even though this information was not available when we did the analysis presented herein, we were able to get an indication of students' progress toward degree attainment. Included in HESO's database is the student level (freshman-senior) at which a student is enrolled for each fall. Thus, we were able to infer whether University of Minnesota leavers seemed to be making progress toward degree attainment by examining changes in their student status level over time. Being able to track leavers' academic success was important to University of Minnesota researchers and administrators since the Twin Cities campus has (relatively) low graduation rates and these low rates have been an area of concern to policymakers within the institution and state. It has often been suggested that inclusion of institutional leavers who graduated from another institution would boost the University's graduation statistics but no empirical evidence was ever available to support these claims.

Table 8 is presented to shed some light on how much graduation rates would change if leavers who appeared to graduate from other institutions were included in University of Minnesota statistics. Two sets of statistics are reported: the official University graduation rates for the 1986 cohort ("Reported" column) and the "Adjusted" graduation rate. The latter includes "likely graduates" who are defined as 1) students completing enough credits to be classified as seniors in a four-year degree granting institution, 2) students who finished at least two years (of chronological time) in a vocational program at a community college, vocational, or technical institution. Undoubtedly some students who finished only one year in a vocational program received a certificate, license, or other credential, but these students were not counted as likely graduates

Table 8
University of Minnesota Graduation Rates After Adjustment

1986 Entering Cohort Graduation Rate			
Status	Reported	Adjusted	Difference
4 Years After Entry	8.3%	10.2%	1.9%
5 Years After Entry	28.8%	29.5%	0.7%
6 Years After Entry	38.9%	39.5%	0.6%
7 Years After Entry	43.2%	43.3%	0.1%
8 Years After Entry	45.0%	45.2%	0.2%

because of our inability to differentiate between them and students who dropped out without certification. With the exception of the four-year rates, inclusion of likely graduates does not significantly alter the University's overall graduation rates. Graduation rates could change significantly, however, when subsets of the overall population are examined. Obviously this analysis is less than optimum, but our intentions were not statistical precision but rather being able to demonstrate that this type of analysis would be possible once the appropriate data (degree year and term) were included in the statewide tracking database.

A similar analysis was conducted to examine how the inclusion of students who were enrolled in another Minnesota higher education institution would affect the University of Minnesota's retention rates. As shown in Table 9, the University's retention rates increase by roughly 2.5 to 5.5 percent when students who reenrolled at other Minnesota institutions are included as retained. The biggest difference is in year four when there is a 5.5 percent difference between the reported and adjusted rates. Undoubtedly, adjusted graduation and retention rates would be even higher if we had term-by-term information (rather than just fall-to-fall) and were able to track leavers who reenrolled at institutions outside the state of Minnesota.

Table 9
University of Minnesota Retention
Rates After Adjustment

	1986 Entering Cohort Graduation Rate		
Status	Reported	Adjusted	Difference
1 Year After Entry	80.3%	82.7%	2.4%
2 Years After Entry	67.1%	71.9%	4.8%
3 Years After Entry	60.9%	66.3%	5.4%
4 Years After Entry	47.2%	52.7%	5.5%
5 Years After Entry	21.6%	25.9%	4.4%
6 Years After Entry	9.9%	13.0%	3.1%
7 Years After Entry	6.0%	8.3%	2.4%
8 Years After Entry	3.9%	6.6%	2.7%

Summary

The analysis presented above indicates that a few distinct patterns of reenrollment behavior of University of

Minnesota leavers emerge. Generally, students who exit the institution before degree completion have demographic characteristics that are similar to stayers. Leavers are more likely, however, to be students with low entrance test scores and high school rank percentiles, and therefore lower scores on the admissions index (AAR). Sixty percent of all University of Minnesota leavers do so early (after one or two years) in their academic careers. Students who leave the University of Minnesota after one year of enrollment have grade point averages below acceptable levels, no matter the college of initial entry. Students who leave the institution later in their academic careers have grade point averages above the level acceptable for continuation in any of the University's collegiate units, though these averages fall far short of the requirements often needed to transfer to preferred upper division units like the health sciences.

Where a student eventually reenrolls is related to their duration of enrollment at the University of Minnesota. Of students who leave the institution after one year and then enroll in a state higher education system, community colleges and vocational/technical institutions are the most likely destination. Students who leave after two years of University enrollment are as likely to reenroll in the state college system as the community college system. Students who leave the institution after three or four years and reenroll in another state institution are overwhelmingly choosing four-year institutions (private or other publics). Most students who leave the University and reenroll in another higher education institution are choosing to remain in Twin Cities' metropolitan area institutions. Finally, leavers who reenroll in another higher education institution *appear* to finish their programs of study. About 63 percent of leavers attain senior status in a four-year institution or have attended a vocational/technical college long enough to have completed a program.

Limitations of the Study

This study was undertaken to demonstrate the potential benefits of matching institutional and statewide tracking information. Our intention was to provide descriptive information about the reentry patterns of University of Minnesota leavers. A more complete analysis would attempt to discover the causal reasons why students left the institution, why they left at particular times, and what their reasons were for reenrolling in other higher education systems or institutions after leaving the study institution.

Because this project was designed as an example of how to use statewide tracking data, and because we were testing our capacity to comply with the GRS, we only examined a single cohort of entering students. The cohort used is dated and patterns of leaving and reenrollment may have changed considerably. A more complete analysis would track multiple and more recent

cohorts to examine whether patterns of reenrollment have changed over time.

Since HESO's database only includes fall enrollment data, we were only able to track leavers from fall-to-fall. Certainly some of these leavers reenter and exit institutions at other points within the academic year. If so, some leavers may not be found in HESO's system but may actually be enrolled at one of the state's higher education institutions. A more comprehensive tracking system would include term-by-term information, thereby providing a more adequate representation of the longitudinal history of the state's enrolled students.

Also, we were only able to locate transfer-out students who then reenrolled in higher education institutions within Minnesota. Undoubtedly some students leave the University of Minnesota and reenroll in higher education institutions outside the state. Minnesota has tuition reciprocity agreements with Wisconsin, North and South Dakota, Manitoba, and a few schools in Northern Iowa and many students take advantage of these agreements. For example, the typical fall entering class at the University of Minnesota-Twin Cities campus is comprised of about one-quarter Wisconsin residents. Given the large numbers of students that cross state lines to attend college it would seem mutually beneficial for these states to routinely share enrollment data so that a more accurate accounting of increasingly mobile students can take place.

Finally, using "likely graduates" to indicate whether a student successfully completed college is certainly suboptimal. As mentioned above, our intention was not statistical precision, rather, we wanted to demonstrate the potential uses of degree attainment information once it became available in the HESO database. At the time of the initial matching of the institutional data with the HESO database, the latter did not contain degree attainment information. Thus, it was impossible to determine whether a student had, in fact, graduated. We used a "second best" alternative in order to gauge how inclusion of this information might affect University graduation rates if successful students were included. Analysts who conduct similar research in the future will not have to use our approach since the HESO database now contains degree attainment information.

Policy Implications

This descriptive analysis, and more importantly the use of statewide tracking systems, has policy implications for the University of Minnesota, institutional researchers, and for higher education in general. Well documented in the retention and attrition literature is that most students leave college early in their college careers. This exodus is generally attributed to a bad-fit between the individual and the institution (Tinto, 1975, 1993). The data presented above indicates that a substantial proportion of University of Minnesota leavers do so early in their academic careers. The University must decide whether they should attempt to intervene to reduce this early exit. One strategy is to identify at-risk students during the admissions process and provide them with more information about the institution, suggest academic and career counseling resources that are available, or encourage them to enroll elsewhere. Once enrolled, the University could provide students with early leaving propensities counseling on how to succeed in college. This strategy has been implemented in the College of Liberal Arts at the study institution with some success (DesJardins, 1997).

The finding that students below the mean on admission's criteria are at high risk of dropout also has implications for institutional researchers. When conducting inferential analyses of student attrition, regressors indicating 1) whether a student is above or below the mean of the entering class on the admissions criteria and 2) by how much a student is above or below the mean should be included. These measures seem to be good indicators of academic fit and have proven to be significant predictors of application and enrollment behavior (Manski and Wise, 1983; Manski, 1989; Weiler, 1994).

Another important issue for Minnesota's institutions of higher education and state policymakers is to examine why some students spend four or five years enrolled at the University only to transfer at this late stage to another four-year institution. It may be that these students are not able to make the transition to upper-division University course work in their desired field of study or, as suggested above, they may be making economic decisions about where to attain their degree. More study is needed to examine why these students leave late in their academic careers and what (if anything) should be done about it.

Even though SRK does not require institutions to track "transfer-outs" at this time (it is voluntary to do so), tracking institutional leavers will probably become mandatory in the future. Therefore, institutional researchers must become adept at solving the complexities of merging institutional and statewide databases to track institutional leavers. Institutional researchers must be willing to interact with new constituencies (approved statewide agencies or other institutions within and outside one's state) and work to understand better the nuances of other institutions' students, data systems, and policies. At a minimum, states enrolling large number of students from outside their borders should pursue agreements allowing an exchange of information that would improve inter-state tracking capabilities. In doing the analyses for this paper we often wondered why Minnesota and neighboring states have long-standing tuition reciprocity agreements but (to date) have no systematic way to track students who cross state lines.

In some states, tracking institutional leavers falls under the domain of a state agency. Statewide tracking systems often have advantages over single institution databases. "First, state-level systems are more efficient; rather than every institution in a state developing its own tracking system, information can be analyzed centrally and provided back to institutions. Second, and more importantly, these systems allow tracking across institutions, providing more complete information on student outcomes: which students actually drop out, which students later graduate, and so on" (Russell and Chisholm, 1995, p.45). We would add that using a comprehensive tracking system; that is, one that also includes detailed information about student labor market and other outcomes, is preferable to post-college outcomes assessment methods often used in the past. Surveying students after college is very expensive, it usually takes a long time, and this methodology often suffers from severe attrition problems that make any generalizations about the individuals being followed suspect. Comprehensive tracking systems like those in place in Florida, Texas, and Missouri (to name a few) make student follow-up relatively inexpensive, provide information in a more timely manner, and are able to track very high percentages of the initial student populations, thereby avoiding serious sampling problems. For instance, as of 1995 Florida's system (see http://www.firn.edu/doe/fetpip/) was doing Job Training and Partnership Act (JTPA) follow-ups for about $1.95 per person compared to $19 per completed interview nationally. A citizens' watchdog group has estimated that over the 10 years of its existence, Florida's system has saved the taxpayers $3.1 million per year. Also, using a tracking database developed by the Coordinating Board for Higher Education, Missouri now does JTPA follow-ups (and other workforce development, welfare reform and job training evaluations) for about 10 to 20 cents for every person tracked.

From societies point of view, it may be that the stakeholders of higher education should be more concerned about student outcomes (like graduation rates and labor market success) within our *system* of higher education. If higher education institutions can demonstrate that their leavers eventually graduate from another institution and are successful in the labor market, then the stakeholders of higher education may be less concerned about institution-specific outcomes.

But as the analyses conducted in this paper demonstrates, statewide tracking systems can also permit institutions to better understand actual outcomes and provide information that cannot be ascertained by using single institution data sources. Data linkage systems like those in use in other states (see Russell and Chisholm, 1995, p.46 for a detailed display of states with statewide tracking systems and their capabilities) provide a number of potential benefits to state policymakers in general and institutions of higher education in particular. Not only are these systems effective at tracking students longitudinally but they are also very cost efficient. If states like Minnesota had more comprehensive tracking systems (like those mentioned above) it would allow policymakers to understand better the demands that various subpopulations put on social service agencies. An integration of comprehensive statewide systems could fundamentally change the debate about a number of educational and public policy issues by permitting researchers to document the individual and social benefits of taxpayer supported programs like education.

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