



SFU

SIMON FRASER UNIVERSITY
INSTITUTIONAL RESEARCH AND PLANNING

2007 PNAIRP Best Paper

**Using the Power of Pivot Tables
For Student Retention Reporting at
Simon Fraser University**

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For AIR Seattle, Washington
Association for Institutional Research
May 26, 2008

This paper and accompanying slide handouts are available on
SFU's Institutional Research and Planning web site at:

<http://www.sfu.ca/irp/Students/index.html#retention>

INTRODUCTION

A wealth of student retention research suggests a number of factors might be associated with student retention, attrition and degree completion. Institutional researchers are increasingly being asked to provide reports on the state of student retention at their institution and the typical response is to provide a number of static and rigid reports to university and college administrators. Invariably, these reports lead to more questions and requests for additional reports, displays and cross-tabulations. Our academic leaders and administrators simply want to gain a better understanding of the numerous dimensions and complexities of student retention, especially for a specific group or subset of the student population.

We could certainly perform some regressions or other statistical models on our data, but Pascarella and Terenzini suggest that, "Research approaches that try to isolate the influence of a *few* variables for *all* students will simply miss the point and probably provide little in the way of useful, practice- or policy-relevant evidence" (1998). These retention experts are not suggesting that we put regression models aside, but perhaps they are implying that we can enlighten the various stakeholders within our institution by giving them the power and flexibility to view student retention data in an infinite number of ways. This is why the Dynamic Student Retention Reporting Tool at Simon Fraser University (SFU) was developed.

For a number of years, SFU has had the luxury of ignoring student attrition during a sustained period of excess demand for admission to BC universities. Recently, however, we have developed a renewed interest in student retention because the abundant pool of well-qualified university applicants appears to be declining. While this softening demand for university spaces might be attributed to changing demographics and a booming BC economy, SFU recognizes that it should do a better job of retaining its students. During this enrollment panic, Institutional Research and Planning (IRP) at SFU was approached for "some information on student retention". IRP very quickly responded with a flexible and dynamic tool to allow users to view and analyze student retention information in a variety of ways and along a number of different dimensions. The tool allows academic administrators to make their own judgments about the factors contributing to or associated with undergraduate student success or failure in their program area. The tool also has the added benefit of transferring much of the ad hoc analysis from IRP to the user's desktop.

During this presentation, you will learn how SFU's Dynamic Student Retention Reporting Tool was developed and how easy it is to use and maintain. You might wish to develop a similar tool at your own institution. This tool will also be used in a demonstration to reveal some of the student retention findings at SFU.

Note that the Dynamic Student Retention Reporting Tool is a descriptive tool only. While the tool is not predictive, the underlying data could easily be used for statistical analysis, multiple regressions or predictive models. We should also be aware that the existence of relationships in the data does not necessarily imply causality (i.e. GPA vs. attrition).

STUDENT RETENTION – WHAT DOES IT MEAN?

Clarity of Definition:

Clear and consistent definitions of student retention, attrition and persistence are difficult to find, especially when different institutions and organizations develop their own measures for their own purposes. Berge and Huang (2004) admit that clarity on this topic is “complex and problematic”, but they do provide three succinct definitions which are consistent with SFU’s perspective on this topic:

Retention – Continued student participation in a learning event to completion, (which in higher education could be a course, program, institution or system).

Attrition – Decline in the number of students from the beginning to the end of the course, program, institution or system.

Persistence – The result of students’ decisions to continue their participation in the learning event.

Levitz, Noel and Richter (1999) define **persistence** as an *individual* performance indicator and **retention** as an *institutional* performance measure. Measuring student persistence requires knowledge of the student’s academic goals or intentions, whereas measuring an institution’s student retention rate requires the collective measurement of student persistence.

While SFU does not know the specific intentions of each and every one of its students, the university acknowledges that students enroll with a variety of intentions: Some do not intend to complete a degree (Hoyt and Winn call these students “**opt-outs**”); some intend to complete their degree over a longer time horizon by taking a reduced course load or “**stopping out**” for one or more terms along the way; others will take the traditional route and complete their degree in four years.

Without the knowledge of our students’ intentions, the meaningfulness and utility of SFU’s existing measures of student retention are imprecise. SFU does not currently survey its incoming and outgoing students to measure their intentions or goals nor subsequently measure the extent to which these student intentions and goals are achieved. Grayson and Grayson (2003) suggest that the best predictor of retention is to directly ask our students if they plan to stay or go.

SFU Definitions:

Looking backward from the current term, a student’s retention status is defined on the basis of when they last registered at SFU.

Persisters – Students who registered at SFU within the last three terms, but have not yet graduated with a degree.

Opt-Outs – These students leave the institution before completing a degree, consistent with their initial intentions (Hoyt and Winn, 2004). These students are not identified in SFU’s information systems.

Stopouts – Students who last registered within the last 4, 5 or 6 terms, but have not yet graduated.

Dropouts – Students who last registered more than 6 terms ago.

Completers – Students who graduated.

Old Versus New Paradigm:

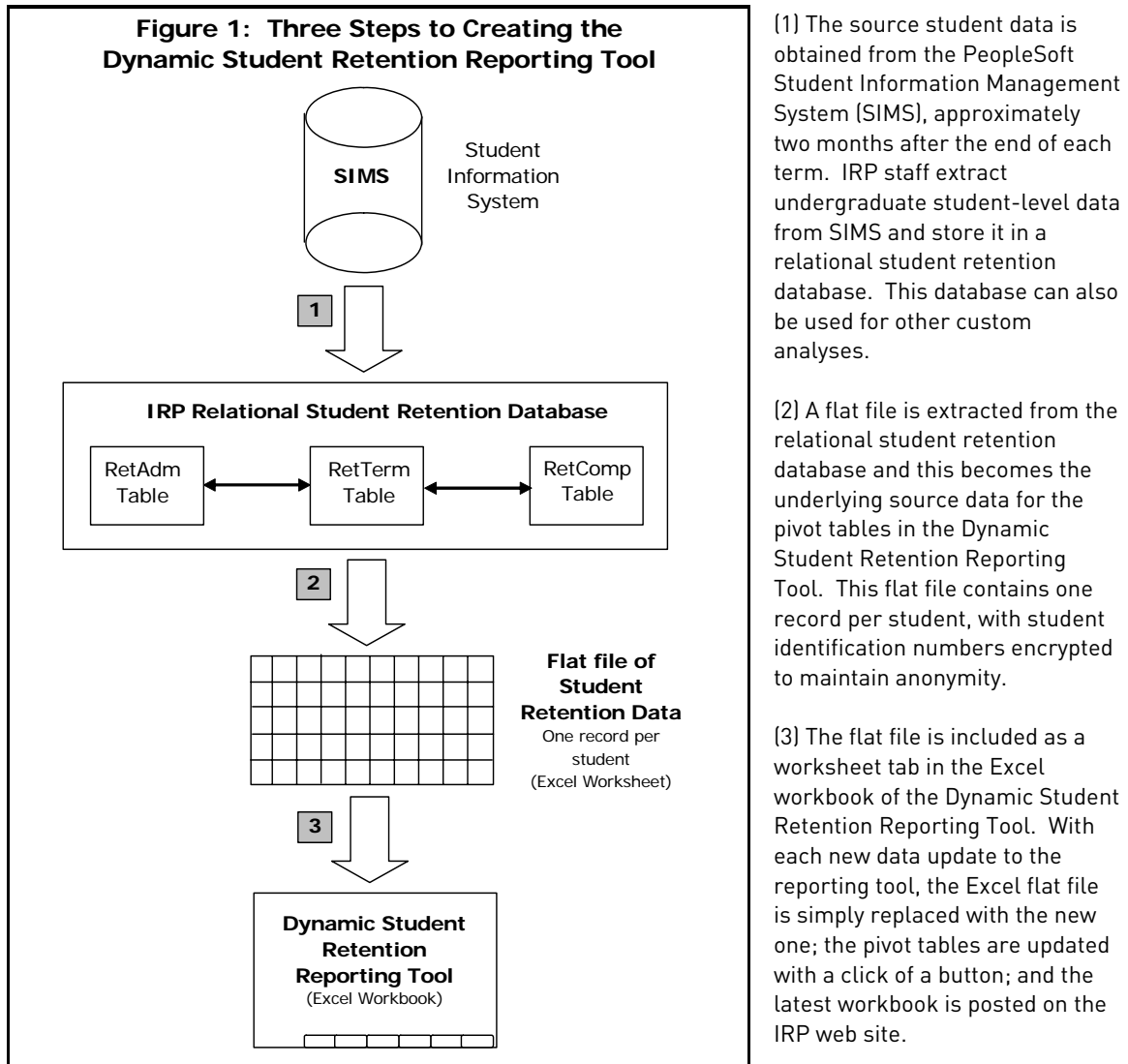
Student retention research has evolved over the years and so have the attitudes and perceptions of the problem. Vincent Tinto (2006) suggests that the old paradigm, “*The student has failed, not the institution*”, has been replaced with the new paradigm, “*The institution has failed; students are victims*”.

DYNAMIC STUDENT RETENTION REPORTING TOOL -- HOW IT WORKS

The Dynamic Student Retention Reporting Tool is an Excel workbook, consisting of a number of pivot tables. These pivot tables can be manipulated by the users by filtering the data, re-orienting rows and columns or adding and removing elements from the table. Users can also create their own custom pivot tables.

The Dynamic Student Retention Reporting Tool is restricted to authorized users only, via a campus authentication process (username and password) on the IRP web site. These authorized users include IRP staff and other selected academic administrators within the university. New users may gain access to the tool via a request to Institutional Research and Planning. Individuals external to the institution are not normally provided access to this tool. Public reports pertaining to student retention are available to external users on the IRP web site at: <http://www.sfu.ca/irp/Students/retention/index.html>.

Creating, updating and maintaining the Dynamic Retention Reporting Tool is straightforward. Updates occur three times per year and this involves a three-step process (see Figure 1):



DATA ELEMENTS

The underlying flat file in the Dynamic Student Retention Reporting Tool provides a number of retention, attrition and completion indicators for each student admitted since 1996/97. These indicators are current for each student in the file, as at the most recent extract (i.e. end of fiscal year 2006/07). A list of data elements is provided in Appendix A and a brief overview of the primary data elements is provided below:

- Year and term of admission to SFU
- Basis of admission category
- Admission GPA score
- Sex, and age at time of admission
- Previous high school and district
- College of transfer and transfer credits
- International student indicator and country of origin
- Credits attempted and completed
- Cumulative GPA in the first term
- Most recent term of registration at SFU
- Last faculty and program of registration at SFU
- Indicators of survival in the first term, first year, second year, etc.
- Retention status (persister, stopout, dropout, completer)
- Cumulative SFU credits and transfer credits attempted and passed
- Cumulative GPA at 30, 60 and 90 credits
- Average career credit load and full-time student indicator
- Graduation term and elapsed time to graduation
- Graduation degree, faculty and program
- Graduation GPA

STUDENT RETENTION IS MULTI-FACETED

The Dynamic Student Retention Reporting Tool is useful for examining the academic variables affecting student retention at SFU, but it is important to acknowledge that many other factors (not readily available in our student systems) probably have an effect on student retention at SFU, such as:

- Academic and social integration,
- Positive interaction with faculty, staff and other students,
- Student goals and commitment,
- Student orientation,
- First year experience,
- Finances and ability to pay,
- Access to supplemental instruction,¹
- Academic advising,
- Availability of courses,

¹ "Supplemental instruction" involves peer-assisted academic support to students in introductory "gatekeeper" courses, that is, courses with traditionally high failure rates (Lotkowski, V.A., Robbins, S.B., Noeth, R.J. (2004). The Role of academic and non-academic factors in improving college retention. Iowa City, IA: ACT.)

- Family responsibilities,
- Employment status and hours of employment,
- Living arrangements,
- Student satisfaction.

While it is beyond the scope of this report to investigate these other factors, Institutional Research and Planning at SFU released a report in October of 2007 to do just that.

*Understanding Student Retention at SFU – Why are Students Leaving SFU?*² provides a synthesis of findings from numerous student surveys. Based on the feedback from new and continuing students, baccalaureate graduates and early leavers, the report suggests that SFU might be falling short on a number of the dimensions listed above and points to areas requiring further research.

A BRIEF SUMMARY OF THE STATE OF STUDENT RETENTION AT SFU

We now turn to a brief description of the state of student retention at SFU, as described by SFU's Dynamic Student Retention Reporting Tool. The following summary of findings is described in greater detail in the full report *Understanding Student Retention at SFU – How Does SFU Measure Up?*² In the full report, various sources of published student retention research were used as a framework for discussion and analysis to describe the student retention situation at SFU.

Student persistence, degree completion, time to graduation, and dropout/stopout behaviour are included in the analysis and the results reveal that better student retention outcomes are generally associated with the following factors or student characteristics:

1. Higher admission GPA's,
2. Admission direct from high school (as opposed to delayed-entry),
3. Female,
4. Admission at a younger age,
5. Domestic student status (rather than international),
6. Admission to the Faculty of Business,
7. Higher cumulative GPA's in the first term,
8. Full-time credit load,
9. Maintaining a continuous enrollment with few or no stopouts.

A brief synopsis of the published research and the relevant SFU findings are provided below:

- *Vincent Tinto suggests a number of "pre-entry characteristics" will strongly influence student retention rates, one of which is high school grades. Students admitted to SFU directly from BC secondary schools with **higher entrance averages** typically achieve higher CGPA's in their first term and after 30 and 60 credits and upon graduation; their degree completion rates are higher; they drop out and stop out at lower rates; and their*

² <http://www.sfu.ca/irp/Students/retention/index.html>

rates of poor academic standing (OAP and RTW)³ are lower. Similar findings are revealed for BC College Transfer students, by admission GPA.

- *Berkner et al (2002) found that students who delay entry into postsecondary education after high school are less likely to earn bachelors degrees.* Compared to students who delay their entry into postsecondary education by more than one year, **direct-entry** students are admitted to SFU with admission averages slightly higher than delayed-entry students and they are less likely to experience poor academic standing, less likely to drop out and therefore, more likely to complete a bachelor's degree.
- Compared to older students, **younger students** achieve higher degree completion rates, higher persistence rates and lower dropout rates than older students. This is likely because younger students enter SFU with higher admission averages than older students, but it could also reflect differences in credit loads and academic goals. *Moore (2007) suggests that younger students might be more motivated in completing their credential, given that their credential will give them the greatest potential for increasing their lifetime earnings.*
- With good academic performance (low OAP and RTW rates) and seemingly high dropout rates, many **older students might in fact be opting out**, rather than dropping out. These "opt-outs" might be dabbling in courses with no intention of completing a degree; they take the courses they want and then leave. This difficulty in distinguishing opt-outs from dropouts suggests that SFU would be in a better position to provide meaningful measures of student achievement if the goals and academic intentions of each of our students was more clearly identified upon admission and re-assessed on an ongoing basis.
- *Daniel Drolet (October, 2007) provides evidence that "boys seem to underachieve educationally relative to girls" and Moore et al (2007) also found that females enroll and complete degrees faster than males – females are likely to complete within five years while males are still persisting and therefore taking longer to complete.* On average, **female students** are admitted to SFU with higher admission GPA's than male students. Females complete degrees at significantly higher rates and they graduate in less time. Despite their higher admission averages and higher degree completion rates, there is no evidence of a gender gap in academic performance among degree completers – the change in GPA from admission to graduation is virtually the same for the two groups. Reflected in their lower dropout rates, female students are less likely than males to experience academic standing difficulties (OAP or RTW).
- *Research in Australian higher education finds that international students have lower retention rates than domestic students (van Stolk et al, 2007); and Grayson (2005) found that domestic student GPA's at selected Canadian universities were higher than GPA's achieved by international students.* How well do international students perform at SFU? **International students** admitted to SFU from BC Colleges have higher degree completion rates than domestic students, mainly because they have higher registration persistence – they stop out less frequently than domestic students. However, international students achieve lower first term GPA's and lower cumulative GPA's at SFU

³ OAP=On Academic Probation; RTW=Required to Withdraw.

than domestic students, even when controlling for admission GPA. International students have higher OAP and RTW rates and they suffer a greater “transfer shock” – their GPA decline from admission to the end of their first term is 0.56 grade points, compared to a 0.42 decline for domestic students. Although the CGPA’s for both groups do gradually recover over the course of their studies at SFU, on average, the CGPA’s of international students do not improve to the same extent as domestic students.

- Student retention at SFU varies by **Faculty**:
 - Students admitted to the Faculty of Business achieve higher retention rates and degree completion rates than students admitted to other Faculties. At 67%, BC12 direct-entry students admitted to the Faculty of Business have the highest six-year graduation rate. By comparison, the six-year graduation rate of the other Faculties range from 48% to 55% (excluding Education with few direct admits).
 - The student dropout rate is highest among those admitted to “no specific faculty”; dropout rates are also relatively high among students admitted to the Faculties of Science and Arts & Social Sciences. Business has the lowest dropout rate.
 - Within two years of admission to SFU (from 1996/97 to 2001/02), 29% of students across all Faculties were placed on academic probation (OAP) and 11% were required to withdraw (RTW). These rates ranged from a high of 36% OAP and 14% RTW in the Faculty of Science to a low of 9% OAP and 3% RTW in Business.
- Students may **switch from one Faculty to another** over the course of their studies at SFU. Faculty switching might be a measure of student uncertainty or unclear academic intentions and this may have an impact on student retention.
 - Over two-thirds of students remain in the faculty to which they were admitted.
 - Some students are more likely than others to switch out of the Faculty to which they were admitted, including Science students, male students, direct-entry BC12 students and international students.
- *Murtaugh, Burns and Schuster (1999) found that the probability of returning for a second year of college increased dramatically with higher GPA’s. Higher **cumulative GPA** achievement by the end of the first term at SFU is associated with more positive student retention (partly attributed to our academic standing policy for continuance). Students with higher first-term CGPA’s achieved lower rates of OAP and RTW, lower dropout rates, higher long-run cumulative GPA’s and higher degree completion rates.*
- *Driscoll (2007) found that the number of courses that college students took in their first semester was associated with higher persistence rates from Fall to Spring and higher grades in the first semester⁴. In looking at **course enrollment patterns**, it was found*

⁴ In Driscoll’s study, these were “transfer-eligible” college courses.

that students who took just one course (three or fewer credits) in their first term were less likely to persist at SFU; students taking more than three courses (ten credits or more) in their first term achieved higher degree completion rates. Part-time students generally achieve lower GPA's and lower persistence rates than full-time students.

- *Moore et al (2007) found that maintaining continuous enrollment without stopping out resulted in higher completion rates.* Maintaining **continuous enrollment** with few or no stopouts was common among SFU students who were admitted with higher admission GPA's. These students with infrequent stopouts achieved low OAP and RTW rates and higher long-run degree completion rates than students with frequent stopouts.
- **When do students leave?** *Published research consistently finds that the majority of students who drop out of post-secondary institutions leave between the first and second year.* In total, 21.5% of BC12 direct-entry students admitted to SFU in 2000/01 had left SFU without a degree by 2006/07, of which 43% of these 447 students had left within their first year (first three terms at SFU). *Levitz, Noel and Richter suggest that attrition rates reduce by half in each of the subsequent years in which the student is retained.* The attrition rates of this SFU cohort, also reduce in each of the subsequent years, with 22%, then 16%, 13% and 6% of the dropouts leaving by the end of the second, third, fourth and fifth years. Retaining more students in the first year might significantly reduce the attrition rate in subsequent years and overall for the cohort.
- **Do they return?** SFU's flexible degree program structure allows students to stop out from their studies for one or more terms and return to SFU in a later term. Students with more credits prior to stopping out are more likely to return to SFU and they return sooner than students with fewer credits prior to stopping out.

CONCLUSION

Excel Pivot Tables are a powerful tool for institutional researchers and planners. This tool can easily be used to provide student retention information, in all its dimensions and complexities, to those interested in performing their own exploration and analysis. Transferring the power of the tool directly to academic administrators and program managers provides users with the flexibility to explore the data in a variety of ways and along a number of different dimensions. This allows university staff to make their own judgments about the factors associated with retention, attrition and student success in their program area. Another added bonus of this approach is that it frees up more time for institutional researchers to pursue other important research initiatives!

APPENDIX A: DYNAMIC STUDENT RETENTION REPORTING TOOL - FIELD DEFINITIONS

Field Name	Description
EmplidE	Student number (encrypted)
stuocount	student counter - each record in the file represents one student
admit_acyr	Academic year of admission to SFU
admit_fyr	Fiscal year of admission to SFU
admit_term	SFU admission term
admit_season	Admit season (1=Spring, 4=Summer, 7=Fall)
boagrp	Basis of Admission Group (this is an aggregation of Basis of Admission Codes - see next worksheet "BasisAdmGroups")
direct	Whether BC12 was a direct or non-direct entry student (not applicable to other basis of admission groups)
basis_admit_code	Basis of Admission Code
avgtype	Admission Average Type
adm_gpa	Admission GPA (if available)
adm_pct	Admission % Score (if available)
adm_gpaconv	Admission score converted to 4-point Admission GPA scale (0 GPA's are blank and excluded from averages)
adm_pctconv	Admission score converted to percentage scale (0%'s are blank and excluded from calculated averages)
adm_gpagrp	Admission score converted to 4-point Admission GPA scale (grouped in 0.25 ranges)
adm_pctgrp	Admission score converted to percentage scale (grouped in 10% ranges)
entry_age	Age upon admission to SFU
sex	1=male, 0=female
country	Country of origin
school_district	School district
lmdist	Graduated from a school district in the Lower Mainland (1=Yes, 0=No)
high_school	Last secondary school
college_maxtfr	College from which maximum credits were transferred
intl	International student indicator (1=international student, 0=domestic student)
tuition_res	Tuition residence code
entry_fac	Faculty upon admission
entry_prog	Primary academic program upon admission
tfratadm	Transfer credits upon admission to SFU
unt_taken_gpa1	Units (credit hours) taken in the first term at SFU and included in the GPA
unt_passd_gpa1	Units (credits hours) passed in the first term at SFU
cgpa1	Cumulative GPA at the end of the first term at SFU
acad_stand1	Academic standing at the end of term 1 at SFU
oap	Indicates if student went on academic probation (OAP) within the first two years at SFU
oapterm	Term number when student went OAP
rtw	Indicates if student was required to withdraw (RTW) within the first two years at SFU
rtwterm	Term number when student was RTW'd
wdr	Indicates if student withdrew from a term (WDR) within the first two years at SFU (and may or may not have returned to SFU)
wdrterm	Term number when student was WDR'd
lastreg	Last term of registration at SFU
last_fac	Last faculty when registered at SFU (this might be after degree completion and therefore different from entry fac)
last_prog	Last program when registered at SFU (this might be after degree completion and therefore different from entry fac)
maxreg	Maximum number of possible terms of registration at SFU, based on when student was first admitted
survive_term1	Indicates if student survived their first term at SFU (returned for a second term if registered for the first term)
survive_year1	Indicates if student survived their first year at SFU (registered in any term after 3 elapsed terms since admission to SFU).
survive_year2	Indicates if student survived their second year at SFU (registered in any term after 6 elapsed terms since admission to SFU).
survive_year3	Indicates if student survived their third year at SFU (registered in any term after 9 elapsed terms since admission to SFU).
survive_year4	Indicates if student survived their fourth year at SFU (registered in any term after 12 elapsed terms since admission to SFU).
survive_year5	Indicates if student survived their fifth year at SFU (registered in any term after 18 elapsed terms since admission to SFU).
persist	Registered within the last three terms, but not yet graduated with a degree.
stopout	Registered within the last 4, 5 or 6 terms, but not yet graduated
dropout	Last registered more than 6 terms ago

APPENDIX A, Continued**Field Name Description**

maxsfuattempt	Total SFU hours attempted
maxsfuhrs	Total SFU hours passed
maxcumhrs	Total SFU+TFR hours passed
maxtfrhrs	Total transfer credit hours passed
survive_30hrs	Completed at least 30 credit hours (TFR + SFU hrs), as at date of extract
survive_60hrs	Completed at least 60 credit hours (TFR + SFU hrs), as at date of extract
survive_90hrs	Completed at least 90 credit hours (TFR + SFU hrs), as at date of extract
survive_120hrs	Completed at least 120 credit hours (TFR + SFU hrs), as at date of extract
strm30	Term in which 30 credits or more completed
strm60	Term in which 60 credits or more completed
strm90	Term in which 90 credits or more completed
credits30	Actual number of credits completed (where credits >= 30 credits)
credits60	Actual number of credits completed (where credits >= 60 credits)
credits90	Actual number of credits completed (where credits >= 90 credits)
cgpa30	CGPA at 30 credits
cgpa60	CGPA at 60 credits
cgpa90	CGPA at 90 credits
creditload	Career credit load, on average
ft	FT student indicator (career credit load must average 12 or more credits)
passrate	Proportion of credits passed as a % of credits attempted
grad	Graduation indicator (1=graduated with a degree, 0=did not graduate with degree)
othgrad	Non-degree graduation indicator (1=graduated with a certificate, pdp, pbd, othr; 0=did not complete non-degree)
grad_term	Term of degree graduation
grad_elapsed_terms	Number of terms elapsed from time of admission to time of degree completion
grad_reg_terms	Number of terms of registration, from time of admission to time of degree completion
grad4yr	Indicates of student graduated with a degree in 4 years or less (1=graduated, 0=did not)
grad5yr	Indicates of student graduated with a degree in 5 years or less (1=graduated, 0=did not)
grad6yr	Indicates of student graduated with a degree in 6 years or less (1=graduated, 0=did not)
grad7yr	Indicates of student graduated with a degree in 7 years or less (1=graduated, 0=did not)
grad_degree	Degree at graduation
grad_faculty	Faculty at graduation
grad_prog	Primary academic program upon graduation
grad_gpa	CGPA at time of degree completion

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