Transfer Students: Can We Predict Their Success?

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Purpose of Study

Sam Houston State University's transfer students make up about half of its incoming students each fall semester. This study's purpose is to analyze the transfer students, and create a model to determine a student's likelihood of success (graduating) at SHSU.



Transfer Student Study Overview

Fall 2013 SHSU First-Time Transfer Student Survey

Transfer Student Background Demographics

Transfer Student Analysis

•How To Run Binary Logistic Regression: Backward Likelihood Ratio in SPSS

First-Time Transfer Student Success Model



Fall 2013 SHSU First-Time Transfer Student Survey



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Fall 2013 Transfer Student Survey Purpose

From where are they coming?

•Why do they leave their previous institution?

•Why do they choose our university?



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Fall 2013 Transfer Student Survey Procedures

Create Survey Questionnaire

- Identify Survey Sample Group: 2385 First Time Transfer Students enrolled in Fall 2013 at SHSU. Downloaded the Survey Data
- Received Departmental Approval for Gift Card Incentive
- Institutional Review Board Application and Approval
- Used LimeSurvey Software to Distribute Survey to Sample Group
- Two Reminder Emails Were Sent

- Survey Closed After Three Weeks with a 21.3% **Response Rate**
- - Performed a Random Sample Drawing of Three Students Who Completed the Survey for the Gift Card Incentive
 - Analyzed Survey Results



Fall 2013 Transfer Student Survey Demographics Comparison: Gender





Fall 2013 Transfer Student Survey Demographics Comparison: Age Range





Fall 2013 Transfer Student Survey Demographics Comparison: Ethnicity





Which of the following best describes the type of institution from which you most recently transferred?











Transfer Scholarship Conditions:

- First-time SHSU student, enrolling full-time at SHSU
- Transfer from an accredited community college or university
- Be an undergraduate student, seeking their first bachelors degree
- Have a minimum of 45 transferable academic credit hours
- Have a minimum cumulative GPA of 2.75



Did you receive any transfer scholarships from SHSU?

Yes

No

Not Reported





Transfer Student Background Demographics



Transfer Student Study Demographics: Ethnicity



Transfer Student Study Demographics: Gender



Transfer Student Study Demographics: First Generation Status



Note: In Fall 2007, the first generation data was inconsistent.



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Transfer Student Study Demographics: Academic Course Load



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Transfer Student Study Demographics: College



Transfer Student Study Demographics: Starting Age

The average starting age from Fall 2005 through Fall 2009 for SHSU First Time Transfer students is 22.

The median starting age from Fall 2005 through Fall 2009 for SHSU First Time Transfer students is 21.



Transfer Student Study Demographics: Average Transfer GPA









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Transfer Student Analysis



Logistic Regression

Used to predict the presence or absence of an outcome based on values of a set of predictor variables.

When there are multiple independent variables the resulting model is:

$$ln(y) = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \dots + \beta_m x_m + \epsilon$$

 β_j for all j = 0, 1, 2, ..., m



Backward Elimination

Considers the full model with all independent variables.

Eliminates the least contributing variable, using the *t* or *F* statistics.

The process is repeated until all the remaining variables have a significant p-value.

•When a variable has been dropped it can not be reentered into the model.



Likelihood Ratio

The likelihood ratio test is a test of the sufficiency of a smaller model versus a more complex model.

The null hypothesis of the test states that the smaller model provides as good a fit for the data as the larger model.

If the null hypothesis is rejected, then the alternative, larger model provides a significant improvement over the smaller model.



How To Run Binary Logistic Regression: Backward Likelihood Ratio in SPSS



Variables

Dependent Variables:

 4 Year Graduation Rate (Fall 2005 – Fall 2009)

Independent Variables:

- Starting Age
- Transfer GPA
- Transfer Credits
- Transfer Institution Type
- Developmental
- College
- Academic Course Load
- First Generation Status *



Variable Definition

First Generation – A student is considered a first generation student when neither parent has received a Bachelor's Degree or higher.



Recoding Continuous Variables

Continuous Variables:

- Starting Age
- Transfer GPA
- Transfer Credits

Used Quartiles to normalize these continuous variables into categorical variables.



Recoding Continuous Variables

Quartile	Starting Age	Transfer GPA	Transfer Credit
1 st Quartile	0 – 19	3.1300 - 4.0000	69 and Up
2 nd Quartile	20	2.7500 - 3.1299	55 - 68
3 rd Quartile	21 - 22	2.4000 - 2.7499	37 - 54
4 th Quartile	23 and Up	0.0000 – 2.3999	0 – 36



Running Test in SPSS

Drop Down Menu

Analyze

- Regression
 - Binary Logistic...

Analyze	Direct <u>M</u> arketing <u>G</u>	raphs	s <u>U</u> tilitie	s Add- <u>o</u> r	ns <u>W</u> i	indow	Help		
Re	ports	•				5			
D <u>e</u> scriptive Statistics Ta <u>b</u> les		•							
		•	Width	Decimals	6	Label			
Co	mpare Means			0					
<u>G</u> eneral Linear Model Generali <u>z</u> ed Linear Models Mixed Models				0					
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Re	aression	•	Autz	matic Line	or Mode	alina	-		
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Neural Networks			Linear						
Classify Dimension Reduction Sc <u>a</u> le <u>N</u> onparametric Tests			Curve Estimation Partial Least Squares Binary Logistic						
			Multinomial Logistic Ordinal Probit						
Fo	Forecasting								
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Mu	Itiple Response	•	Nonlinear						
🛃 Mi	ssing Value Anal <u>y</u> sis		Weight Estimation						
Mu	Itiple Imputation	•	2-Stage Least Squares						
Co	mplex Samples	•	Optimal Scaling (CATREG)						
Qu	ality Control			0					
R	C Curve			0	_				



Running Test in SPSS

Binary Logistic Regression Window

- Insert Dependent Variable
- Insert Covariates (Independent Variable)
- Select Method as Backward: LR







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Variable	В	S.E.	Wald	df	Sig.
STARTING AGE			51.768	3	.000
STARTING AGE (0 – 19)	.592	.091	42.055	1	.000
STARTING AGE (20)	.435	.072	36.091	1	.000
STARTING AGE (21-22)	.312	.064	23.605	1	.000
TRANSFER GPA			199.844	4	.000
TRANSFER GPA (3.13 – 4.00)	.688	.880	.611	1	.434
TRANSFER GPA (2.75 – 3.12)	.278	.880	.100	1	.752
TRANSFER GPA (2.40 – 2.74)	.069	.879	.006	1	.938
TRANSFER GPA (0.00 – 2.39)	246	.879	.078	1	.780
TRANSFER CREDITS			403.437	4	.000
TRANSFER CREDITS (69 and Up)	3.451	1.145	9.078	1	.003
TRANSFER CREDITS (55 – 68)	3.306	1.145	8.342	1	.004
TRANSFER CREDITS (37 – 54)	2.840	1.143	6.168	1	.013
TRANSFER CREDITS (0 – 36)	1.876	1.141	2.700	1	.100
ACADEMIC COURSE LOAD (Full-Time)	.702	.062	129.349	1	.000
COLLEGE			76.297	4	.000
COLLEGE (Arts & Sciences)	312	.070	20.022	1	.000
COLLEGE (Business Administration)	.039	.073	.286	1	.593
COLLEGE (Criminal Justice)	.327	.085	14.794	1	.000
COLLEGE (Humanities & Social Sciences)	147	.074	3.912	1	.048
FIRST-GENERATION			12.507	2	.002
FIRST-GENERATION (First Generation)	110	.060	3.421	1	.064
FIRST-GENERATION (Not First Generation)	.074	.064	1.347	1	.246
INSTITUTION TYPE (2-yr College)	.184	.061	9.072	1	.003
DEVELOPMENTAL (Take Developmental at SHSU)	750	.082	83.586	1	.000
Constant	-3.629	.737	24.262	1	.000



 $ln(y) = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \dots + \beta_m x_m + \epsilon$



Constant = β_0 = -3.629

ln(y) = -3.629



Starting Age (Age):

 $\beta_1 = 0.19$ years old = .592 $\beta_2 = 20$ years old = .435 $\beta_3 = 21.22$ years old = .312

 $ln(y) = -3.629 + .592x_{Age(0-19)} + .435x_{Age(20)} + .312x_{Age(21-22)} + \dots + \beta_m x_m$



Transfer GPA (GPA):

 $\beta_4 = 3.13 - 4.00 = .688$ $\beta_5 = 2.75 - 3.12 = .435$ $\beta_6 = 2.40 - 2.74 = .069$ $\beta_7 = 0.00 - 2.39 = -.246$

 $ln(y) = -3.629 + .592x_{Age\ (0-19)} + .435x_{Age\ (20)} + .312x_{Age\ (21-22)} + .688x_{GPA\ (3.13-4.00)} + .688x_{GPA\ (3.13-4.00)} + .435x_{GPA\ (2.75-3.12)} + .069x_{GPA\ (2.40-2.74)} + -.246x_{GPA\ (0.00-2.39)} + \dots + \beta_m x_m$



Transfer Credits (Cred):

 $\beta_8 = 69 \text{ and } \text{Up} = 3.451$ $\beta_9 = 55-68 = 3.306$ $\beta_{10} = 37-54 = 2.840$ $\beta_{11} = 0-36 = 1.876$

$$ln(y) = -3.629 + .592x_{Age\ (0-19)} + .435x_{Age\ (20)} + .312x_{Age\ (21-22)} + .688x_{GPA\ (3.13-4.00)} + .435x_{GPA\ (2.75-3.12)} + .069x_{GPA\ (2.40-2.74)} + -.246x_{GPA\ (0.00-2.39)} + .3.451x_{Cred\ (69+)} + 3.306x_{Cred\ (55-68)} + 2.840x_{Cred\ (37-54)} + 1.876x_{Cred\ (0-36)} + \dots + \beta_m x_m$$



Academic Course Load (ACLD):

 β_{12} = Full-Time = .702

$$\begin{split} ln(y) &= -3.629 + .592 x_{Age\ (0-19)} + .435 x_{Age\ (20)} + .312 x_{Age\ (21-22)} \\ &+ .688 x_{GPA\ (3.13-4.00)} + .435 x_{GPA\ (2.75-3.12)} + .069 x_{GPA\ (2.40-2.74)} + -.246 x_{GPA\ (0.00-2.39)} \\ &+ 3.451 x_{Cred\ (69+)} + 3.306 x_{Cred\ (55-68)} + 2.840 x_{Cred\ (37-54)} + 1.876 x_{Cred\ (0-36)} \\ &+ .702 x_{ACLD\ (Full-Time)} + \dots + \beta_m x_m \end{split}$$



College (Coll):

 β_{13} = Arts & Sciences (COAS) = -.312 β_{14} = Business Administration (COBA) = .039

 β_{15} = Criminal Justice (COCJ) = .327 β_{16} = Humanities & Social Sciences (CHSS) = -.147

$$\begin{split} ln(y) &= -3.629 + .592 x_{Age\ (0-19)} + .435 x_{Age\ (20)} + .312 x_{Age\ (21-22)} \\ &+ .688 x_{GPA\ (3.13-4.00)} + .435 x_{GPA\ (2.75-3.12)} + .069 x_{GPA\ (2.40-2.74)} + -.246 x_{GPA\ (0.00-2.39)} \\ &+ 3.451 x_{Cred\ (69+)} + 3.306 x_{Cred\ (55-68)} + 2.840 x_{Cred\ (37-54)} + 1.876 x_{Cred\ (0-36)} \\ &+ .702 x_{ACLD\ (Full-Time)} \\ &+ -.312 x_{Coll\ (COAS)} + .039 x_{Coll\ (COBA)} + .327 x_{Coll\ (COCl)} + -.147 x_{Coll\ (CHSS)} + \dots + \beta_m x_m \end{split}$$



First Generation (FG):

$$\beta_{17}$$
= First Generation = -.110 β_{18} = Not First Generation = .074

$$\begin{split} ln(y) &= -3.629 + .592 x_{Age\ (0-19)} + .435 x_{Age\ (20)} + .312 x_{Age\ (21-22)} \\ &+ .688 x_{GPA\ (3.13-4.00)} + .435 x_{GPA\ (2.75-3.12)} + .069 x_{GPA\ (2.40-2.74)} + -.246 x_{GPA\ (0.00-2.39)} \\ &+ 3.451 x_{Cred\ (69+)} + 3.306 x_{Cred\ (55-68)} + 2.840 x_{Cred\ (37-54)} + 1.876 x_{Cred\ (0-36)} \\ &+ .702 x_{ACLD\ (Full-Time)} \\ &+ -.312 x_{Coll\ (COAS)} + .039 x_{Coll\ (COBA)} + .327 x_{Coll\ (COCJ)} + -.147 x_{Coll\ (CHSS)} \\ &+ .110 x_{FG\ (First\ Gen)} + .074 x_{FG\ (Not\ First\ Gen)} + \cdots + \beta_m x_m \end{split}$$



Institution Type (IT):

 β_{19} = 2yr Institution (2yr) = .184

$$\begin{split} ln(y) &= -3.629 + .592 x_{Age\ (0-19)} + .435 x_{Age\ (20)} + .312 x_{Age\ (21-22)} \\ &+ .688 x_{GPA\ (3.13-4.00)} + .435 x_{GPA\ (2.75-3.12)} + .069 x_{GPA\ (2.40-2.74)} + -.246 x_{GPA\ (0.00-2.39)} \\ &+ 3.451 x_{Cred\ (69+)} + 3.306 x_{Cred\ (55-68)} + 2.840 x_{Cred\ (37-54)} + 1.876 x_{Cred\ (0-36)} \\ &+ .702 x_{ACLD\ (Full-Time)} \\ &+ -.312 x_{Coll\ (COAS)} + .039 x_{Coll\ (COBA)} + .327 x_{Coll\ (COCJ)} + -.147 x_{Coll\ (CHSS)} \\ &+ .110 x_{FG\ (First\ Gen)} + .074 x_{FG\ (Not\ First\ Gen)} \\ &+ .184 x_{IT\ (2yr)} + \dots + \beta_m x_m \end{split}$$

Developmental (Dev):

$$\beta_{20}$$
= Took Developmental Course at SHSU (Yes) = -.750

$$ln(y) = -3.629 + .592x_{Age (0-19)} + .435x_{Age (20)} + .312x_{Age (21-22)} + .688x_{GPA (3.13-4.00)} + .435x_{GPA (2.75-3.12)} + .069x_{GPA (2.40-2.74)} + -.246x_{GPA (0.00-2.39)} + 3.451x_{Cred (69+)} + 3.306x_{Cred (55-68)} + 2.840x_{Cred (37-54)} + 1.876x_{Cred (0-36)} + .702x_{ACLD (Full-Time)} + -.312x_{Coll (COAS)} + .039x_{Coll (COBA)} + .327x_{Coll (COCJ)} + -.147x_{Coll (CHSS)} + -.110x_{FG (First Gen)} + .074x_{FG (Not First Gen)} + .184x_{IT (2yr)} + -.750x_{Dev (Yes)}$$

 $ln(y) = -3.629 + .592x_{Age(0-19)} + .435x_{Age(20)} + .312x_{Age(21-22)}$

- $+ .688 x_{GPA(3.13-4.00)} + .435 x_{GPA(2.75-3.12)} + .069 x_{GPA(2.40-2.74)} + -.246 x_{GPA(0.00-2.39)}$
- $+ 3.451 x_{cred\ (69+)} + 3.306 x_{cred\ (55-68)} + 2.840 x_{cred\ (37-54)} + 1.876 x_{cred\ (0-36)}$
- $+.702x_{ACLD (Full-Time)}$
- $+ -.312x_{Coll (COAS)} + .039x_{Coll (COBA)} + .327x_{Coll (COCJ)} + -.147x_{Coll (CHSS)}$
- $+ -.110x_{FG (First Gen)} + .074x_{FG (Not First Gen)}$
- $+.184x_{IT(2yr)}$
- + -.750 $x_{Dev(Yes)}$
- $+\epsilon$



Default Comparison:

- Starting Age = 23 and Up
- Transfer GPA = Unknown
- Transfer Credits = Unknown
- Academic Course Load = Part-Time
- College = College of Education
- First Generation = Unknown
- Institution Type = 4 Year University
- Developmental = No



Most Likely to Succeed in this Model:

- Starting Age = 0-19
- Transfer GPA = 3.13-4.00
- Transfer Credits = 69 and Up
- Academic Course Load = Full-Time
- College = College of Criminal Justice
- First Generation = Non- First Generation
- Institution Type = 2 Year Institution
- Developmental = Yes



Contact Information



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