

HETS Best Practices Showcase

Cost Effective Academic Analytics with MS Excel

Retention and graduation patterns for 37 semester cohorts of student data

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Collaborative Initiative between the Vice-Presidency for Academic, Student Affairs and Systemic Planning (VPASASP) of Interamerican University of Puerto Rico (IAUPR) and 8 of its 9 campuses: Arecibo (Lead Campus) and Aguadilla, Barranquitas, Bayamón, Guayama, Fajardo, Metropolitan and San Germán

Mission

To research and develop software for academic analytics that support academic decision making in order to promote student retention and graduation.

Faculty initiative at Arecibo Campus funded by Chancellors since 2007. The project has the support of the VPASASP since 2009.



Project - Personnel

- ▶ Two faculty members from different academic fields with release time and compensation interested in:
 - ▶ institutional research with warehoused student data to understand patterns and relations related to academic performance and retention behavior
 - ▶ technological tools for researching student information to obtain descriptions, analysis and models related to retention behavior and the effectiveness of institutional actions
- ▶ An expert programmer (Mr. Héctor Rosa Zeno) that develops customized software (ERDU) using Visual Basic to generate reports of the analysis in MS Excel worksheets
 - ▶ the software replicates research results developing a system capable of integrating new observations for reporting changes in patterns, analysis and models for subsequent terms and newly admitted cohorts
- ▶ Personnel of Center for Information Technology (CIT) of the Central Office of the IAUPR system



Project - Infrastructure

- ▶ Development Phase:
 - ▶ Personal Computers, MS Office and Visual Basic
 - ▶ Data warehoused in the institutional database, Banner, for all semester cohorts since August 1995 (using the same structure)
 - ▶ Validated query that extracts a data set from Banner with 73 variables per student by cohort
 - ▶ The query is developed by the personnel of Center for Information Technology (CIT) of the Central Office of the IAUPR system in response to requests made by researchers
 - ▶ The data is validated by researchers and programmer to assure that it tracks correctly each student for every subsequent semester since the first enrollment
 - ▶ Project personnel collaborates to assure its integrity



Project - Research Process

- ▶ Identification of patterns and trends within cohort data using statistical and mathematical concepts
 - ▶ Research to establish how data extracted relate to models used in demographic, epidemiological and business analysis
 - ▶ For example, Odds Ratio, Chi square, Net Present Value and Probability Tree Diagrams (*Conditional Probability*)
 - ▶ Results obtained with models are evaluated to determine what they inform about retention and graduation
 - ▶ The analytical scope is applied to other cohorts or campuses
 - ▶ The analysis can be segmented by different levels: campus, academic programs, admission type, individual student



Project - Software Development

- ▶ Descriptive and inferential analysis of data, extracted by query, using MS Excel
 - ▶ 141,071 students who have enrolled in fall or spring cohorts
 - ▶ academic performance variables for each student is tracked for subsequent semesters
 - ▶ For example, students who return 15 years later can be identified
- ▶ Software has analytical structures with **no predefined results**
 - ▶ Menus allow for selection by cohort, specific student populations or by academic and demographic variables



Project - Campus Involvement

- ▶ **Estudio de Retención y Desempeño Universitario - ERDU 5.0**
 - ▶ At present, it is in its 5th version with eight menus and 66 submenus
 - ▶ The version that will be distributed in Spring 2014 includes 19 years or 38 semester cohorts of students enrolled since August 1995
- ▶ Every semester each of the eight (8) campuses receives the new version with recent data extracted from Banner
- ▶ Project personnel provides training to campus representatives
 - ▶ The VPASASP convenes the meeting at the Central Office of the IAUPR system
 - ▶ Training is directed at the needs of particular users



Project - Campus Involvement

- ▶ The Campus authorizes personnel to use the software for planning and decision making related to retention
 - ▶ Authorized personnel can use **ERDU 5.0** using existing computing technology
 - ▶ Personnel in campus offices can replicate the analysis that applies to their role in decision making or interventions
 - ▶ Information can be presented in plans, reports and presentations since they can copy tables and graphs from Excel and paste to Word or Power Point
- ▶ IAUPR system budget guidelines include ERDU as one of the tools for planning



ERDU 5.0

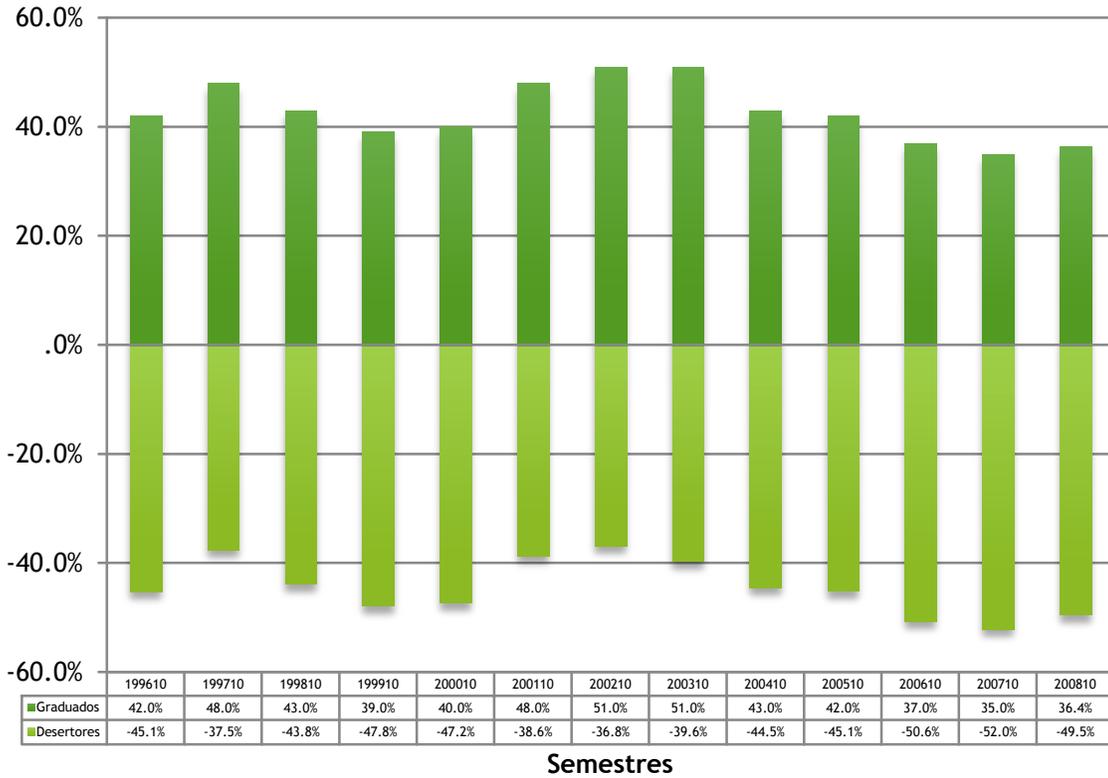
Historical Retention and Graduation Patterns

Changes and constants in historical retention and graduation patterns to inform interventions, projections and to forecast trends



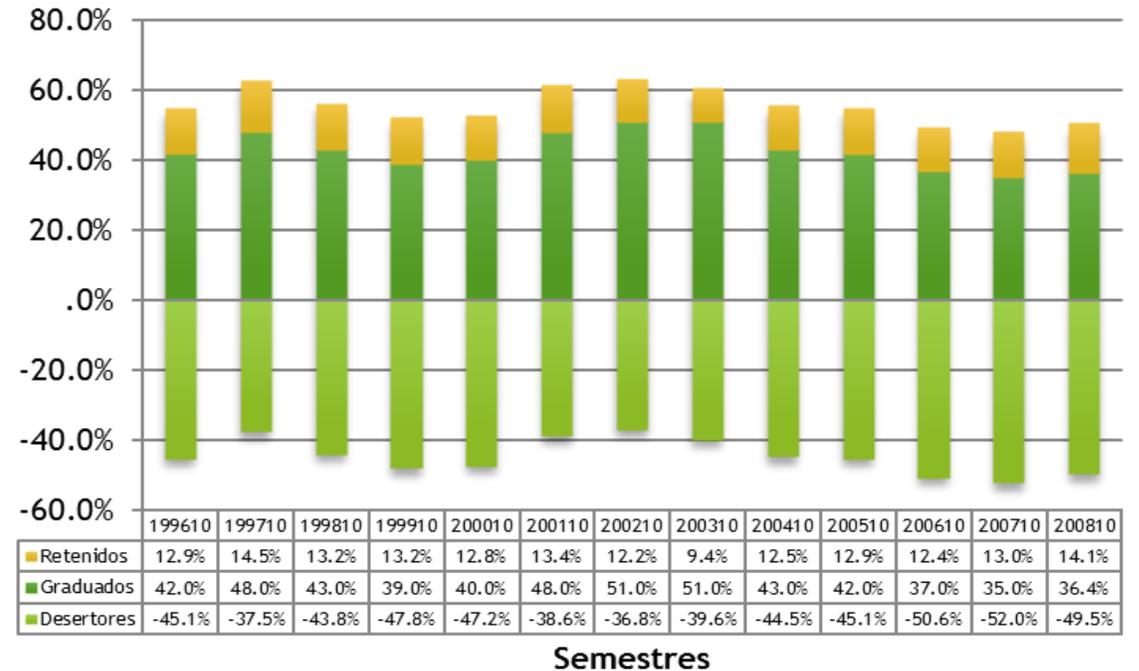
Retention and Graduation Patterns

Graduates and Dropouts at Semester 12
Fall Cohorts ERDU Campus



■ Desertores ■ Graduados

Graduates and Dropouts at Semester 12
Fall Cohorts with retained students
ERDU Campus



■ Desertores ■ Graduados ■ Retenidos

Retention - Academic Performance and Satisfactory Progress Norms

Table 3.5.1: Academic risk of Fall 2009 students (201010) currently enrolled (Fall 2013) by NPAS, Recinto ERDU

Información del Estudiante		Nivel de Riesgo Adjudicado		Datos del Estudiante al Semestre Vigente								
Nombre del Estudiante	Número del Estudiante	Riesgo en la Norma de Progreso Académico Satisfactorio	¿El estudiante está en probatoria?	E-mail	Número de Teléfono	Programa Académico	Total de Créditos del Programa	Total de Créditos Intentados	Créditos en Progreso	Por ciento Pell LEU	GPA Acumulado	Ritmo de Aprobación
estudiante 1	Q000001	1 Muestra Riesgo	No	xx1@gmail.com	787	BS-MICROBIOLOGY	129	70	13	237.504%	1.7	62.86%
estudiante 2	Q000002	3 Muestra Riesgo atenuado por el GPA	No	xx1@gmail.com	787	BSN-NURSING	113	49	12	400.000%	2.13	34.69%
estudiante 3	Q000003	3 Muestra Riesgo atenuado por el GPA	No	xx1@gmail.com	787	BA-PSYCHOLOGY INTERNET	117	55	12	218.750%	2.18	45.45%
estudiante 4	Q000004	3 Muestra Riesgo atenuado por el GPA	Sí	xx1@gmail.com	787	BS-BIOLOGY	125	60	7	0.000%	2.61	46.67%
estudiante 5	Q000005	4 No Muestra Riesgo	No	xx1@gmail.com	787	BSN-NURSING	120	99	11	600.000%	2.8	100.0%
estudiante 6	Q000006	4 No Muestra Riesgo	No	xx1@gmail.com	787	BA-CRIMINAL JUST: INVESTIGA	113	104	12	435.714%	2.68	91.35%
estudiante 7	Q000007	4 No Muestra Riesgo	No	xx1@gmail.com	787	BA-CRIMINAL JUST: INVESTIGA	126	95	12	504.171%	2.2	86.32%
estudiante 8	Q000008	4 No Muestra Riesgo	No	xx1@gmail.com	787	BA-CRIMINAL JUST: INVESTIGA	131	129	13	414.285%	3.45	90.7%
estudiante 9	Q000009	4 No Muestra Riesgo	No	xx1@gmail.com	787	BA-SEC ED: TEACHING OF	131	119	16	455.924%	3.7	89.92%
estudiante 10	Q000010	4 No Muestra Riesgo	No	xx1@gmail.com	787	BBA-ACCOUNTING CPA TRACK	150	109	13	550.000%	2.74	82.57%
estudiante 11	Q000011	4 No Muestra Riesgo	No	xx1@gmail.com	787	BSN-NURSING	120	110	9	600.000%	3	87.27%
estudiante 12	Q000012	4 No Muestra Riesgo	No	xx1@gmail.com	787	BA-SEC ED: TEACHING OF	124	95	13	409.142%	2.64	96.84%
estudiante 13	Q000013	4 No Muestra Riesgo	No	xx1@gmail.com	787	BA-SEC ED: TEACHING OF	121	63	12	600.000%	3.1	76.19%

Personnel of the program for adult students (AVANCE) can use academic performance including GPA and credits earned and pace of completion of the program of adult students to identify at risk students.

Retention - Academic Performance and Satisfactory Progress Norms

What-if analysis
for student
identified as at
risk

Table 3.7: Student status and identified risk in two measures of Satisfactory Progress Norms at the end of the current semester at ERDU Campus. (Avance Student)

Datos del Estudiante	Valor		Identificación de Riesgo	
ID	Q000001			
Nombre	estudiante 1			
Cohorte de admisión	Agosto de 2009			
Programa Académico (Total de créditos)	BS-MICROBIOLOGY (129)			
Créditos intentados	70			
Créditos aprobados (créditos no aprobados)	44 (-26)			
Créditos con nota	44			
Créditos matriculados este semestre	13			
Ritmo de aprobación (66.67%)	62.86%			¿Presenta Riesgo?
GPA semestre pasado	1.75			Si
GPA acumulado	1.70		Si	
Pell LEU	237.504%		No	
Periodo Máximo de Elegibilidad PME =150%:	54.3%		No	
Componente Cualitativo: Escenarios de proyección de riesgo en el GPA acumulado al finalizar el semestre				
Posibles GPA considerados	Posibles ritmo de aprobación considerados			
	50% de los créditos	75% de los créditos	100% de los créditos	
Si logra un GPA igual a 1.50	1.48	1.57	1.65	
Si logra un GPA igual a 2.00	1.54	1.65	1.77	
Si logra un GPA igual a 2.50	1.60	1.74	1.88	
Observación: Presenta riesgo proyectado en los nueve escenarios del GPA al finalizar el semestre.				
Componente Cuantitativo: Escenarios de proyección del ritmo de aprobación al finalizar el semestre				
Posibles ritmo de aprobación considerados	Ritmo de aprobación proyectado			
Si logra aprobar el 50% de los créditos	60.84%			
Si logra aprobar el 66.67% de los créditos	63.45%			
Si logra aprobar el 75% de los créditos	64.76%			
Si logra aprobar el 100% de los créditos	68.67%			
Observación: Presenta riesgo proyectado en tres de los cuatro escenarios del ritmo de aprobación.				

Retention - Historical Patterns and Conditional Probability

- ▶ One of the research questions addressed by the project was to understand how student academic performance in first semester (GPA) increase the probability of graduation.
 - ▶ Analysis using a probability tree diagram for all cohorts from 1995 to 2007 described the path to graduation taken by students who have completed 12 semesters (six academic years). The principal findings was that enrolling in the second semester of study, given that the student obtained a GPA of 2.0 or more in the first semester, is a marker found in over 90% of the students that attain graduation.

ERDU Campus	evento A	logró 2.00	P (A)		evento B	se matriculó sem. 2	P (B A)	Probabilidades condicionada	P (A y B)	Probabilidades conjunta		evento C	valor de C	P (C B y A)
Cohortes acumulados de agosto de 1995 a 2007	Sí	9214	75.61%	¿Se matriculó en el segundo semestre?	Sí	8871	96.28%	P (B A)	72.80%	P (A y B)	¿Se graduó al semestre doce?	Sí	3656	41.21%
					No	343	3.72%	P (B ^c A)	2.81%	P (A y B ^c)		No	5215	58.79%
¿Logró al menos un índice académico general de 2.00 en el primer semestre?	No	2973	24.39%	¿Se matriculó en el segundo semestre?	Sí	1890	63.57%	P (B A ^c)	15.50%	P (A ^c y B)	¿Se graduó al semestre doce?	Sí	19	5.54%
					No	1083	36.43%	P (B ^c A ^c)	8.89%	P (A ^c y B ^c)		No	324	94.46%
N = 12,187														
n = 12187	evento A ^c	no logró 2.00	P (A ^c)		evento B ^c	no se matriculó sem. 2	P (B ^c A ^c)	Probabilidades condicionada	P (A ^c y B ^c)	Probabilidades conjunta		evento C ^c	valor de C ^c	P (C ^c B ^c y A ^c)

Cost Effective Academic Analytics

Assessing the effectiveness of institutional efforts in an attempt to increase retention and graduation rates.



Cost Effective Academic Analytics

- ▶ ERDU 5.0 describes retention and graduation patterns for 37 semester cohorts of student data for eight campuses of the IAUPR system
- ▶ It informs what has happened in the last 19 years and provides a framework for evaluating current performance
 - ▶ It promotes decision making using metrics based on your own historical patterns
 - ▶ It organizes information to support informed interventions with individuals
 - ▶ It uses existing technological infrastructure, personal computers and MS Excel, in order to accomplish low cost analytics of warehoused data for institutional research
- ▶ Institutions committed to planning and evaluation can use this information to measure the effectiveness of actions directed at maintaining or changing retention and graduation patterns



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Information for retention

ERDU 5.0 at work



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