



# Data Visualization in Academic Program Review

Jasmine Ahmad, Academic Program Review

Rina Bongsu-Petersen, Institutional Research & Market Analytics

## Academic Program Review

The Purpose is

to promote continuous quality improvement of academic programs and the larger University

The Process is

responsive to the mission

faculty driven

focused

collegial

data-based

contextual

adaptive

Results in an accountable plan of action

## Academic Program Review

- Launched in 1998
- Each degree-granting department/college in the university is reviewed once in a 10 year megacycle
- Megacycle is divided into 10 cycles



## Academic Program Review

A unit undergoing review will

- write the Program Profile, a self-reflective piece
- receive a university dataset and write a Response to Data
- create research questions based on the Program Profile and Response to Data, then propose a Unit Research Plan
- collect data and write a Unit Research Report
- examine all the evidence collected and creates a plan to move forward, the Memorandum of Understanding

## Response to Data

- Faculty examine University datasets and respond to writing prompts on:
  - Faculty and Staff Information
  - Student Information
  - Student Perceptions of Quality in their Academic Program

## Response to Data: Writing Prompt

### 1) Faculty and Staff Information

Using the data provided by the University, assess and discuss:

- ❖ The demographic profile of your faculty
- ❖ Patterns of workload by full and part-time faculty in the context of your college.

Identify possible question for further study

# University Dataset Example

## Faculty Demographics

Table 1	Faculty Totals and Gender Demographics					
	Female (%)		Male (%)		Total (#)	
	00-'03	04-'07	00-'03	04-'07	00-'03	04-'07
Agricultural Studies	53%	44%	47%	56%	18	20
Life Sciences	51%	38%	49%	62%	113	119
Science College	48%	50%	52%	50%	700	850
DePaul	41%	44%	59%	56%	1,800	2,000

Faculty Totals and Race/Ethnicity Demographics												
Table 2	African American (%)		Asian-Pacific (%)		Hispanic/Latino (%)		Native American (%)		White/Caucasian (%)		Total (#) Averages	
	00-'03	04-'07	00-'03	04-'07	00-'03	04-'07	00-'03	04-'07	00-'03	04-'07	00-'03	04-'07
Agricultural Studies	1%	0%	4%	3%	0%	0%	0%	0%	91%	94%	18	20
Life Sciences	2%	1%	8%	9%	2%	2%	0%	0%	85%	82%	110	119
Science College	7%	6%	5%	5%	5%	6%	0%	0%	81%	78%	700	850
DePaul	6%	7%	5%	8%	4%	5%	1%	0%	82%	80%	1,800	2,000

Overall Faculty Headcount															
Table 3	03-'04		04-'05		05-'06		06-'07		07-'08		Total (#)				
	Part-Time	Full-Time	03-'04	04-'05	05-'06	06-'07	07-'08								
Agricultural Studies	8	11	5	13	7	13	6	14	6	15	18	18	20	20	21
Life Sciences	47	64	45	64	44	68	53	76	49	76	110	109	112	129	125
Science College	451	428	404	425	375	405	385	395	434	416	700	829	780	780	850
DePaul	1,000	800	1,000	900	1,000	1,000	1,000	1,000	1,000	1,000	1,800	1,900	2,000	2,000	2,000

# University Dataset Example Faculty Workload

Table 4	FTE Students / FTE Faculty				
	'03-'04	'04-'05	'05-'06	'06-'07	'07-'08
Agricultural Studies	18 to 1	16 to 1	15 to 1	15 to 1	15 to 1
Life Sciences	17 to 1	15 to 1	16 to 1	16 to 1	15 to 1
Science College	13 to 1	16 to 1	16 to 1	18 to 1	15 to 1
DePaul	12 to 1	15 to 1	14 to 1	15 to 1	15 to 1

Table 5	FTE Faculty Total (#)					FTE Students Total (#)				
	'03-'04	'04-'05	'05-'06	'06-'07	'07-'08	'03-'04	'04-'05	'05-'06	'06-'07	'07-'08
Agricultural Studies	18	18	20	20	21	324	288	300	300	315
Life Sciences	81	86	84	86	96	1,339	1,332	1,326	1,344	1,447
Science College	629	534	555	498	571	8,064	8,496	8,703	8,831	8,445
DePaul	1,800	1,900	2,000	2,000	2,000	21,600	30,000	30,000	30,000	30,000

Student Credit Hours Taught by Faculty															
Table 6	03-'04		04-'05		05-'06		06-'07		07-'08		Total (#)				
	Full-Time (%)	Part-Time (%)	03-'04	04-'05	05-'06	06-'07	07-'08								
Agricultural Studies	77%	23%	77%	23%	71%	29%	73%	27%	78%	22%	10,686	10,674	11,244	11,455	12,135
Life Sciences	66%	34%	69%	31%	69%	31%	69%	31%	68%	32%	63,392	59,714	61,221	64,082	69,499
Science College	65%	35%	68%	32%	70%	30%	62%	42%	63%	37%	350,000	360,000	370,000	390,000	370,000
DePaul	65%	35%	66%	34%	65%	35%	59%	40%	60%	40%	750,000	760,000	740,000	750,000	780,000

## Response to Data: Writing Prompt

### 2) Student Information

Using data provided by the University, assess and discuss:

- ❖ Patterns of enrollment in degrees/concentrations.
- ❖ The diversity of the undergraduate student profile.
- ❖ Degrees conferred, graduation rates and time to graduation patterns for your program(s)
- ❖ Course hours taught for majors and non-majors students in majors courses, service courses and general education courses provided by the department
- ❖ Market share (patterns of interest by enrolling students)

Identify possible questions for further study.

# University Dataset Example

## Student Enrollment & Demographics

Table 7	Undergraduate Declared Major Enrollment							
	2001	2002	2003	2004	2005	2006	2007	2008
Agricultural Studies	262	270	310	351	381	394	418	458
Life Sciences	404	427	453	515	571	615	652	689
Science College	3,740	4,191	4,516	4,891	5,198	5,181	5,193	5,223
DePaul	13,020	14,343	14,585	14,717	14,740	14,893	15,024	15,782

Table 8	Declared Major Enrollment by Gender					
	Male (%)		Female (%)		Total (#)	
	01-'04	05-'08	01-'04	05-'08	01-'04	05-'08
Agricultural Studies	29%	34%	71%	66%	1,193	1,651
Life Sciences	35%	40%	65%	60%	1,799	2,527
Science College	35%	40%	65%	60%	17,338	20,795
DePaul	40%	45%	60%	55%	56,665	60,439

Table 9	Declared Major Enrollment by Race and Ethnicity											
	African American		Asian		Hispanic/Latino		Native American		White/Caucasian		Total (#)	
	01-'04 (%)	05-'08 (%)	01-'04 (%)	05-'08 (%)	01-'04 (%)	05-'08 (%)	01-'04 (%)	05-'08 (%)	01-'04 (%)	05-'08 (%)	01-'04	05-'08
Agricultural Studies	15%	8%	12%	14%	14%	12%	1%	0%	53%	55%	1,193	1,651
Life Sciences	13%	8%	11%	13%	13%	12%	1%	0%	56%	57%	1,799	2,527
Science College	9%	8%	8%	8%	15%	14%	0%	0%	61%	61%	17,338	20,795
DePaul	11%	9%	10%	9%	13%	13%	0%	0%	59%	59%	56,665	60,439

## Response to Data: Writing Prompt

### 3) Student Perceptions of the Quality of their Academic Program

Using data provided from the University surveys: the National Survey of Student Engagement (NSSE), the Alumni Survey, the ACT Advising Survey, and the Graduating Senior Survey assess and discuss:

- ❖ Student satisfaction with the quality and rigor of their academic program and its preparation for life after DePaul.
- ❖ Student satisfaction with advising.
- ❖ Student perceptions of their acquired work-related knowledge and skills: communication (verbal and written), quantitative and analytical skills, etc.
- ❖ Student engagement in community service, internships, extra-curricular and co-curricular opportunities, research with faculty, etc.
- ❖ Student perceptions about their exposure to diversity.
- ❖ Student perceptions about the challenges they face to succeed in their academic programs and competing priorities.
- ❖ Alumni perceptions of their knowledge and abilities gained in their program at DePaul.

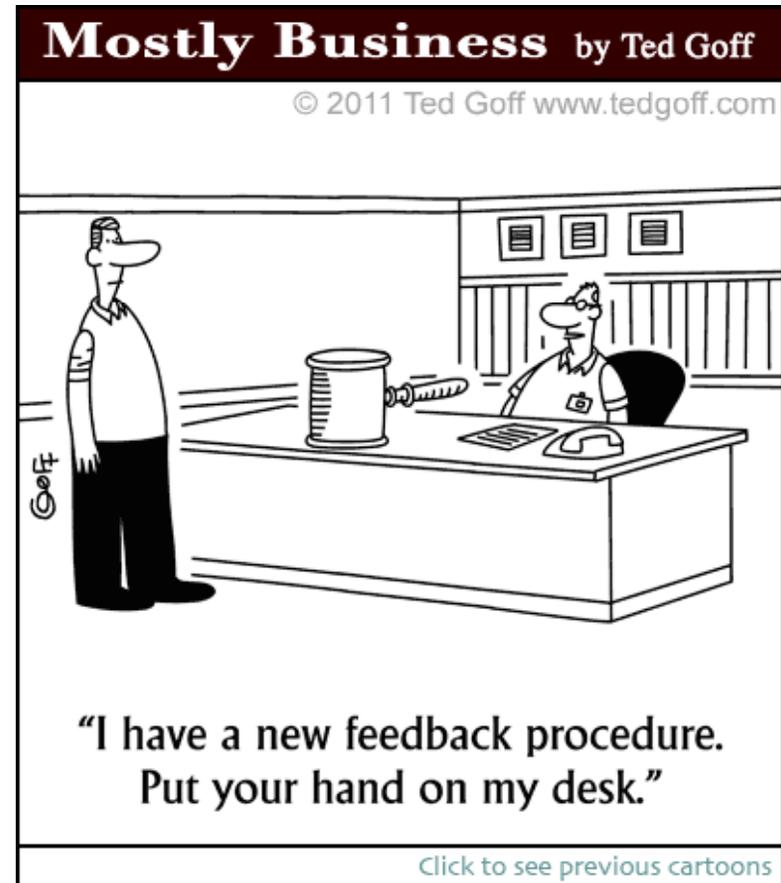
Identify possible questions for further study

## Survey Data

NSSE Questions	DePaul Composite '01-'05 N=1000	Science College Composite '01- '05 N= 343	All Life Science Composite '01- '05 N= 45	Agricultural Studies Composite '01- '05 N= 26	DePaul Composite '06- '08 N= 1700	Science College Composite '06-'08 N=662	All Life Sciences Composite '06-'08 N= 86	Agricultural Studies	Carnegie Peers Composite '06- '08 N=~29,000
<b>Critical Thinking Group</b>									
Coursework emphasizes: Analyzing the basic elements of an idea, experience, or theory	80.0%	90.4%	88.6%	<b>88.5%</b>	87.0%	89.6%	93.7%	<b>95.9%</b>	84.3%
Coursework emphasizes: Synthesizing and organizing ideas, information, or experiences	80.0%	83.7%	81.8%	<b>84.6%</b>	87.0%	83.7%	87.3%	<b>89.8%</b>	75.2%
Coursework emphasizes: Making judgments about the value of information, arguments, or methods	80.0%	78.1%	70.5%	<b>73.1%</b>	87.0%	78.9%	79.7%	<b>81.6%</b>	73.5%
Coursework emphasizes: Applying theories or concepts to practical problems or in new situations	80.0%	82.8%	81.8%	<b>80.8%</b>	87.0%	81.3%	83.5%	<b>85.7%</b>	81.0%
<i>*Percents for this group are based on responses for % Quite a bit/Very Much Categories.</i>									

## APR Satisfaction Survey

- A survey was sent to faculty that had recently undergone program review for feedback



## APR Satisfaction Survey

- The university dataset had low satisfaction ratings
- Survey comments indicated that faculty felt the data was flawed, sample sizes were small, or the data was irrelevant

## Issues with the Data

- Faculty may recognize an error in faculty in counts or enrollments, and it is due to discrepancies between university records and the departments records
- After spotting an error, the unit would view the entire dataset as suspect
- How do we build trust and make datasets that the units will find useful?

## Possible Solutions and Approaches

- Communication
  - Early data meetings to orient unit leaders to the datasets
  - Cross check university and department-level faculty lists and program codes
- Explain the use of data as a source of information to raise questions and prompts internal reflection.
  - Small sample sizes may not be indicative of reality but if the pattern is consistent and worrisome, the faculty could conduct focus groups as part of their research project.
- Empower faculty to create their own data using analytical software and reduces likelihood of human error that occurs in creating tables
- Visual data representation for quicker and easier pattern recognition

# Building Data Visualization & Dashboards

- An effective data visualization turn your data into insights rapidly and clearly.
- A dashboard is a visual display of the most important information needed to achieve one or more objectives which fits entirely on a single computer screen so it can be monitored at a glance (Steven Few)

## Data



## Information



## Presentation



## Knowledge



EpicGraphic.com



**Start with user requirements/needs**

**What question(s) we want to answer**

# Building an effective dashboard is a juggling act

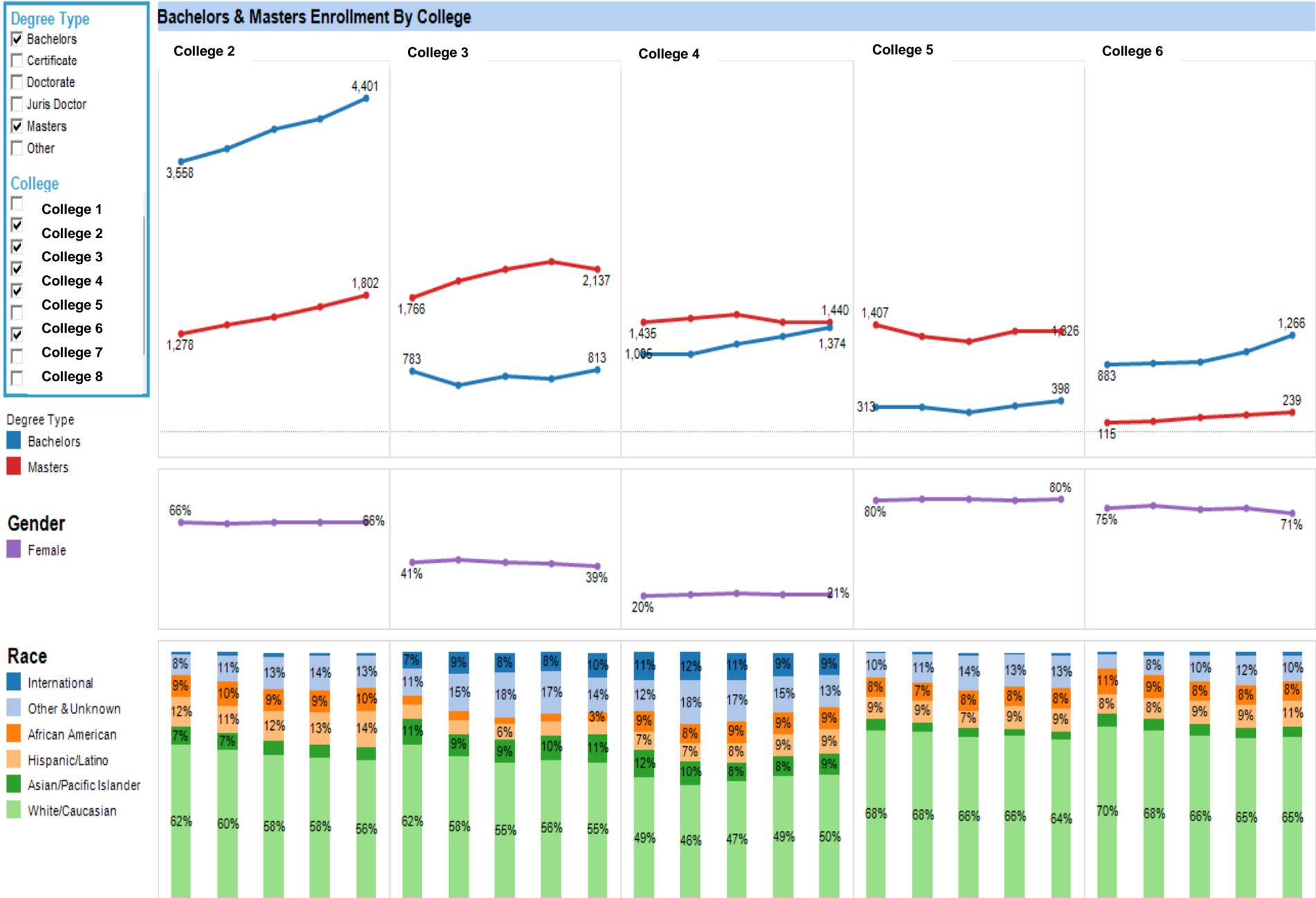


# Dashboard 1: Enrollment and Profile

## User requirements:

- Users need to know the enrollment trend of students by degree, college, department, major
- Users need to know the profile
- Users need to know how the student profile compared to overall profile

### Student Enrollment and Profile By College Fall 2006 - Fall 2010.





**Masters Enrollment and Profiles: By Major, Department, College, All DePaul : 5 Yrs Enrollment, Growth, Gender, Race (Fall 2006 - Fall 2010).**

Select College  
College

Select Dept.  
Dept.

Masters Enrollment By Major *	5Yr	Female (%)	White/Caucasian	Asian/Pacific Isl..	Hispanic/Latino	African American	International	Other & Unknown
<b>Major 1</b> 303 339 423 422 466 54% 28% 28%			65% 51%	9% 8%	3% 3%	1% 2%	18% 26%	10% 11%
<b>Major 2</b> 72 93 98 93 74 3% 25% 28%			76% 73%	4% 7%	3% 3%	3% 4%	4% 1%	10% 11%
<b>Major 3</b> 64 72 71 54 38 -41% 30% 26%			67% 55%	5% 13%	3% 5%	5% 5%	9% 3%	14% 18%
<b>Major 4</b> 27 28 41 28 27 0% 41% 59%			63% 59%	11% 11%	7% 11%	7% 2%	11% 7%	14% 22%
<b>Major 5</b> 3 5 7 46 45 1400% 33% 42%			67% 14%					33% 89%
<b>Major 6</b> 5 6 9 11 12 140% 33% 42%			40% 33%	17% 9%		17% 8%	40% 58%	20% 9%
<b>Major 7</b> 7 11 19 14% 21%			57% 63%	14% 5%	14%		5%	14% 26%
<b>Major 8</b> 2 7 12 13% 25%			50% 83%	14% 17%			14%	50% 29%
<b>Dept.</b> 474 543 658 672 693 46% 28% 30%			67% 52%	7% 8%	3% 2%	2% 2%	14% 19%	10% 17%
<b>College</b> 66 1,989 2,142 2,232 2,137 21% 38% 38%			64% 56%	8% 9%	3% 3%	3% 3%	8% 13%	14% 16%
<b>Masters</b> 6,302 6,559 6,831 7,125 7,244 15% 52% 53%			59% 54%	7% 7%	5% 6%	8% 10%	7% 8%	14% 15%

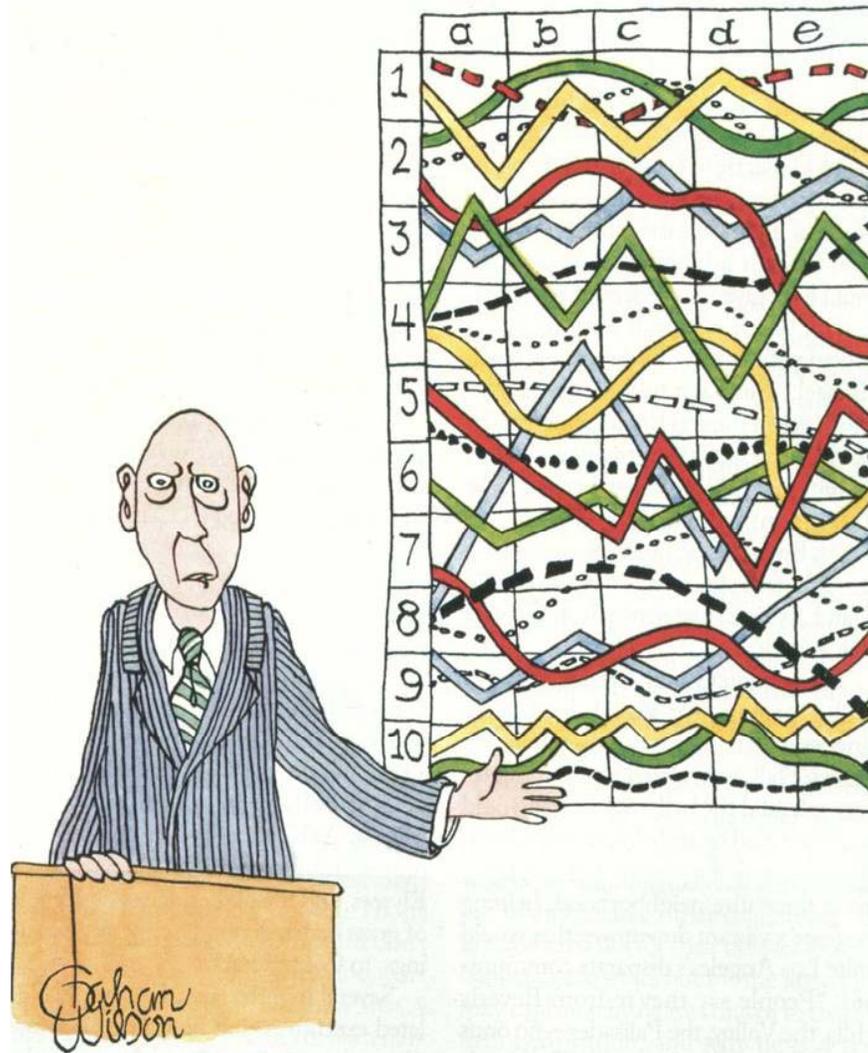
\* BLUE bars = Growth vs prev. year

- Race
- White/Caucasian
  - Asian/Pacific Isla..
  - Hispanic/Latino
  - African American
  - International
  - Other & Unknown

College

College

Please select the college you'd like to compare to.



*"I'll pause for a moment so you can let this information sink in."*

# Dashboard 2: Degree Conferral

## User requirements:

- Users need to know the total degree awarded by degree type, by college, by department, by major
- Users need to know the profile of degree recipients
- Users need to know how the degree recipients profile compared to overall profile

## Dashboard 3: NSSE Surveys

### User requirements:

- Faculty/administrators need to understand student perceptions of their program
- Need to know if the perceptions have improved over time, what area have improved or need improvements.
- Need to know how the unit performed compared to the college, the university and to their Carnegie peers

- Null
- College 1
- College 2
- College 3
- College 4
- College 5
- College 6
- College 7
- College 8

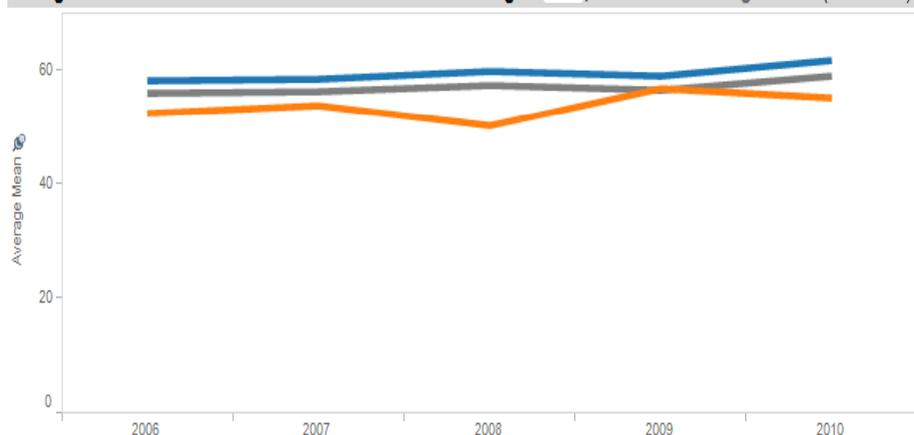
- Academic Advising
- Academic and Intellectual Exp
- Additional College Experiences
- Educational & Personal Grow
- Enriching Educational Experi
- Institutional Environment
- Mental Activities
- Same College?
- Satisfaction



-30% -20% -10% 0% 10% 20% 30% 40% 0% 20% 40% 60% 80% 100%  
 Difference 09-10 vs 06-08 % respondents indicated '3' and '4': 09-10 (blue) vs 06-08 (yellow)

# NSSE Surveys by College, compared to DePaul overall and Carnegie Peers

Average Means for Benchmark Item 'Level of Academic Challenge':  , DePaul and Carnegie Peers (2006-2010)



Benchmark Counts, Means, and Standard Deviations

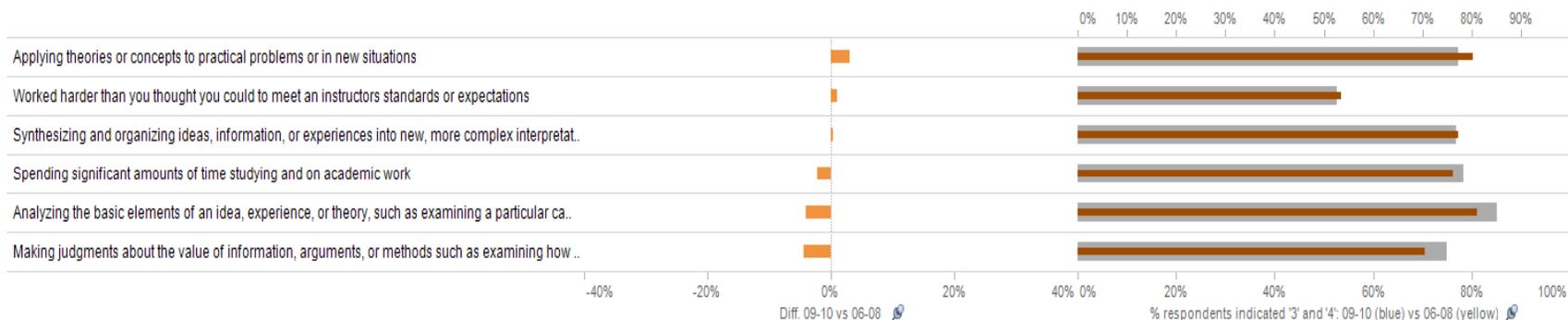
College	2006	2007	2008	2009	2010
<b>College</b>					
Count	67	53	30	29	126
Mean	52	54	50	57	55
Std. Dev.	14	12	16	9	15
<b>DePaul Overall</b>					
Count	721	594	518	438	1,094
Mean	58	58	60	59	62
Std. Dev.	14	14	14	15	15
<b>Carnegie Peers</b>					
Count	7,886	9,660	9,968	12,953	12,547
Mean	56	56	57	56	59
Std. Dev.	14	14	14	14	14

Pls select College and Benchmark Item:

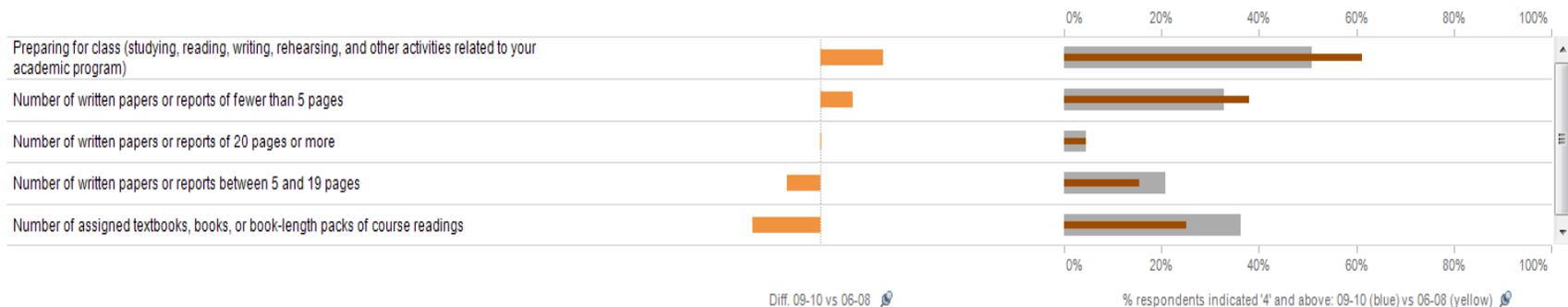
- College**
- College 1
  - College 2
  - College 3
  - College 4
  - College 5
  - College 6
  - College 7
  - College 8
- Benchmark Item**
- Active & Collaborative Learning
  - Enriching Educational Experience
  - Level of Academic Challenge
  - Student Faculty Interactions
  - Supportive Campus Environment

Benchmark Questions and Responses for Benchmark Item 'Level of Academic Challenge'. College:

Results represent % respondents indicated '3' & '4' on questions with response values range from 1 to 4, sorted by highest to lowest 'gains'.



Results represent % respondents indicated '4' & above on questions with response values ranging from 1 to over 4, sorted by highest to lowest 'gains'.



## NSSE Survey 2009-10 vs 2006-08 All students: Question Group A

August 2011

Questions in Group A use a Likert Scale from 1-4. Results represent % respondents who indicate 3 & 4. More details are available in the Read Me section.

Question Group	Question	
Academic and Intellectual Experiences	Asked questions in class or contributed to class discussions	7%
	Received prompt feedback from faculty on your academic performance (written or oral)	7%
	Worked harder than you thought you could to meet an instructors standards or expectations	6%
	Talked about career plans with a faculty member or advisor	4%
	Used an electronic medium (list-serv, chat group, Internet, etc.) to discuss or complete an assignment	4%
	Discussed ideas from your readings or classes with others outside of class (students, family members, coworkers, etc.)	4%
	Used e-mail to communicate with an instructor	4%
	Discussed grades or assignments with an instructor	4%
	Came to class with completing readings or assignments	4%
	Included diverse perspectives (different races, religions, genders, political beliefs, etc.) in class discussions or writing assignm..	4%
	Worked on a paper or project that required integrating ideas or information from various	3%
	Prepared two or more drafts of a paper or assignment before turning it in	3%
	Worked with other students on projects during class	3%
	Had serious conversations with students of a different race or ethnicity than your own	3%
	Made a class presentation	2%
	Had serious conversations with students who are very different from you in terms of their religious beliefs, political opinions, or ..	1%
	Worked with classmates outside of class to prepare class assignments	1%
	Discussed ideas from your reading or classes with faculty members outside of class	1%
	Worked with faculty members on activities other than coursework (committees, orientation, student life activities, etc.)	1%
	Put together ideas or concepts from different courses when completing assignments or during class discussions	-1%
Participated in a community-based project as part of a regular course	-1%	
Tutored or taught other students (paid or voluntary)	-2%	
Additional College Experiences	Exercised or participated in physical fitness activities	3%
	Attended an art exhibit, gallery, play, dance, or other theater performance	2%
	Participated in activities to enhance your spirituality	0%
Academic Advising Satisfaction	Overall, how would you evaluate the quality of academic advising you have received at your institution?	10%
	How would you evaluate your entire educational experience at this institution?	3%



**View available dashboards for public:  
<http://oipr.depaul.edu/>**

**To learn more about APR:  
<http://pres.depaul.edu/aprc/>**

**Contact:**

**Rina: [rbongsu@depaul.edu](mailto:rbongsu@depaul.edu)**

**Jasmine: [jahmad2@depaul.edu](mailto:jahmad2@depaul.edu)**