Sankey Diagram: A Method to Visualize Student Flow and Success

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ECU Student Success Conference
January 25, 2019
What is a Sankey Diagram?
Charles Minard’s **Map of Napoleon’s Russian Campaign of 1812**: overlaid a Sankey diagram onto a geographical map, created in 1869.
• In 1898, Captain Matthew Henry Phineas Riall Sankey used the diagram to show efficiency of a steam engine

• Fits the needs of today’s higher education institutions
How to read a Sankey diagram?
Data and Methodology

• Fall 2010 first-time, first-year student cohort
• Intended major (at Fall 2010 Census Day)
• Student status at the end of the 6th academic year; possible statuses are:
  • Graduated
  • Still Enrolled at ECU
  • Not Enrolled at ECU
• Transfer institutions obtained from National Student Clearinghouse (NSC)
1. For the Fall 2010 FTFY cohort, 109 students chose Engineering as their intended major by Fall 2010 Census Day.

2. These are the students who graduated at ECU with a bachelor’s degree within 6 years (students who graduated with a second degree are counted twice).

Disclaimer: This series of Sankey diagrams do not include all graduates of a major.
Engineering (Intended): 109

3. Due to space limitation, majors with fewer than 3 students were grouped together.

4. 30 students graduated with an Engineering major in 6 years.

5. Students from the original cohort who had not graduated but were still enrolled at ECU in 2016.

How to read a Sankey?
6. Students who neither graduated nor still enrolled at ECU.

7. Transfer institutions obtained from National Student Clearinghouse. Only the first institution to which a student transferred was included. Institutions with few transfer-out students were grouped together.
Selected degree pathway
Sankey diagrams

All based on Fall 2010 first-time, first-year student cohort
Nursing (Intended): 637

- Public Health Studies: 46
- Family Community Services: 21
- Psychology: 18
- Health Services Management: 13
- Communication: 11
- Social Work: 10
- Criminal Justice: 9
- Recreational Therapy: 8
- Rehabilitation Services: 8
- Elementary Education: 7
- Management: 7
- Biology: 6
- Exercise Physiology: 6
- Marketing: 6
- Other Majors (<6): 53

- Nursing: 162
- Still Enrolled at ECU: 17
- Pitt Community College: 75
- Wake Technical Community College: 13
- Fayetteville Technical Community College: 8
- Forsyth Technical Community College: 7
- Cape Fear Community College: 6
- Central Piedmont Community College: 6
- Other Institutions (<6): 94
- Unknown: 20
Biology
(Intended): 390

- Psychology: 25
- Public Health Studies: 20
- Chemistry: 18
- Nursing: 11
- Communication: 8
- Criminal Justice: 7
- Exercise Physiology: 7
- Family Community Services: 6
- Multidisciplinary Studies: 6
- Anthropology: 5
- Health Fitness Specialist: 5
- Political Science: 5
- Health Services Management: 4
- Merchandising: 4
- Sociology: 4

- Still Enrolled at ECU: 11
- Pitt Community College: 30
- Central Piedmont Community College: 5
- Cape Fear Community College: 4
- University of North Carolina - Greensboro: 4
- University of North Carolina - Charlotte: 4
- Other Institutions (<4): 50
- Unknown: 21
- Other Majors (<4): 55

Not Enrolled at ECU: 118
Selected programs from College of Allied Health Sciences

- Health Services Management (Intended): 24
- Health Services Management: 6
- Merchandising: 2
- Nutrition and Dietetics (Intended): 31
- Nutrition and Dietetics: 8
- Other Majors (<2): 14
- Criminal Justice: 2
- Public Health Studies: 4
- Management: 2
- Speech and Hearing Sciences: 10
- Still Enrolled at ECU: 2
- Pitt Community College: 7
- Not Enrolled at ECU: 25
- Other Institutions (<2): 15
- Unknown: 3
- Special Education: 3
- Recreational Therapy: 2
- Hospitality Management: 2
Add quantitative analyses to Sankey diagrams
For the Fall 2010 FTFY cohort, 161 students chose Exercise Physiology as their intended major by Fall 2010 Census Day.

- Graduated from Exercise Physiology: 28
- Graduated from another major: 88
- Not Enrolled at ECU: 38
- Still Enrolled at ECU: 7
- Pitt Community College: 9
- Other Institutions (<3): 25
- Unknown: 4

Other Majors (<4): 45
Health Fitness Specialist: 12
Recreational Therapy: 9
Public Health Studies: 8
Elementary Education: 5
Psychology: 5
Economics: 4
Avg. 1st-Year GPA: 3.0
Avg. HS Weighted GPA: 3.67
Avg. SAT: 1045
Avg. ACT: 20.9

Avg. 1st-Year GPA: 3.5
Avg. HS Weighted GPA: 4.01
Avg. SAT: 1093
Avg. ACT: 22.6

Avg. 1st-Year GPA: 2.4
Avg. HS Weighted GPA: 3.41
Avg. SAT: 1038
Avg. ACT: 22.7

Exercise Physiology (Intended): 161

Other Majors/Still Enrolled: 95
Exercise Physiology: 28
Not Enrolled at ECU: 38

First Year Cumulative GPA

HS Weighted GPA

SAT

ACT
Sankey diagrams with annual snapshots
College of Engineering and Technology: Fall 2012 first-time, first-year admitted or intended majors

**Fall 2012 Census Day**

- **Admitted Major:** 236
- **Intended Major:** 49

**End of 1st Year**

- **First-Year GPA > = 3:** 94
- **First-Year GPA < 3:** 142

**End of 6th Year**

- **Graduated from CET:** 122
- **Not Enrolled:** 96

- **Graduated from other colleges:** 45
- **Enrolled in CET:** 15
- **Enrolled in other colleges:** 7

College of Engineering and Technology
CET Key Insights

• For the Fall 2012 First-time Full-time cohort, 63.5% graduated from ECU in six years.

• At the end of six years, 43% of CET admitted/intended students graduated from CET; 16% graduated from another college; 8% were still enrolled at ECU.

• Students **admitted to CET** at the beginning of their first fall semester:
  – 40% earned a GPA >= 3.0 at the end of the first year.
  – **First-year GPA >= 3.0**: about 70% graduated from CET in six years:
    – **First-year GPA < 3.0**: about 30% graduated from CET in six years; and almost 50% transferred or dropped out.
CET Key Insights (con.)

• Students with an Intended CET major at the beginning of their first fall semester
  – 18% earned a GPA $\geq 3.0$ at the end of the first year.
  – **First-year GPA $\geq 3.0$**, about 30% graduated from CET in six years.
  – **First-year GPA < 3.0**, under 20% graduated from CET in six years; and 50% transferred or dropped out.
College of Business: Fall 2012 first-time, first-year admitted or intended majors (Snapshots taken on Fall Census)
Fall 2012 first-time, first-year students who graduated from COB in 6 years (including students who started at another college)

**Graduated in 4 Years from COB:**
- Management (Year 3): 151
- Management Accounting (Year 3): 57
- Accounting (Year 3): 24
- Finance (Year 3): 67
- Gen Business (Year 3): 9
- Marketing (Year 3): 81

**Graduated in 6 Years from COB:**
- Management (Year 5): 25
- Management Accounting (Year 5): 9
- Accounting (Year 5): 1
- Finance (Year 5): 16
- Hospitality Management (Year 5): 29
- Marketing (Year 5): 16
- MIS (Year 5): 5
- Enrolled in other colleges (Year 5): 1

**Enrolled in other colleges (Year 1):**
- 212

**281 Started as a COB major**

**212 Started Elsewhere**
COB Key Insights

• At the end of six years, 493 of the Fall 2012 first-time first-year students graduated with a degree from COB.
  – 281 (57%) started as an admitted or intended major at COB in their first fall
  – 212 started in a different college

• Students started as a COB major:
  – Management, 140; Accounting, 51; Finance, 18; General Business, 13; Marketing, 55; and MIS, 5
COB Key Insights (cont’d)

• Change of major in six years:
  – Almost 45% of Marketing students changed major between the 1st fall and the 3rd fall
  – When COB students switched majors, they often chose another major within COB
  – As many as 84 students majored in a field outside of COB in their third fall semester, but half of them managed to graduate in four years.
Summary and future work
Summary

• The Sankey diagram can be a powerful tool to depict and identify student success pathways.

• Data collection, correct interpretation, and further analysis are essential to maximize the impact of Sankey diagrams.

• The involvement of stakeholders (YOU!) is also crucial.
Future Work

• Communicate with ECU stakeholders on the creation and interpretation of Sankey diagrams.

• Update Sankey diagrams for most recent student cohorts.

• Find a secure way to post interactive Sankey diagrams online for ECU internal review.
Questions?