

What's Completion Got to Do with It?

Unpacking the Value of Student Short-Term Course-Taking

Terrence Willett, RP Group

CAIR | Anaheim | November 8, 2012

Session Outcomes

1. Analyze how student course-taking behaviors relate to completion and success
2. Describe how this analysis applies in a specific college context
3. Explain resources to support a course-taking analysis and discussions at your own institution

WHY THE FOCUS ON COMPLETION?

The perfect storm of accountability and budget cuts

roi

ACCOUNTABILITY





HOW ELSE CAN WE UNDERSTAND SUCCESS?

What student course-taking behaviors can tell us

Previous Student Classification Efforts

- Adelman (2005). Moving Into Town.
 - **Homeowners** - more than 30 credits from community colleges and 60 percent or more of all their credits came from community colleges
 - **Tenants** - less than 60 percent of their credits came from community colleges.
 - **Visitors** - started in and earned between 1-29 credits from community colleges

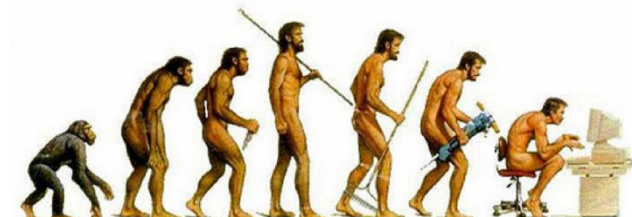


Previous Student Classification Efforts

- Horn (2009) found three clusters: Strongly Directed, Moderately Directed, Not Directed
- Ammon et al. (2008) found nine clusters collapsed into three larger groups: skill upgraders, career advancers, and transfer
- Hagedorn and Prather (2005) found seven clusters including transfer-bound, fully vocational and uni-course
- VanDerLinden (2002) found six clusters of students including a single cluster of skill upgraders and career advancers and two clusters of transfer-oriented students

Peter Bahr's Cluster Analysis

- 165,921 **first-time** students who enrolled in at least one credit or noncredit community college course in fall 2001 (excluded quarter based colleges)
- Followed course-taking patterns over 7 years
- Did **NOT** use factors such as students' race/ethnicity, status as a credit/noncredit student or stated goal
- Used k-means cluster method

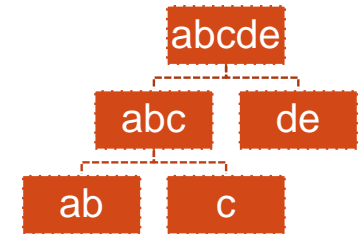


k-means Cluster Method

- Non-hierarchical method
- Number of clusters defined at outset
- Bahr used Euclidean distances
- Step 1 - Assignment (or Expectation): selects mean of clusters
- Step 2 - Update (or Maximization): assigns cluster membership to minimize within cluster variation
- Step 1 begins with a random assignment and algorithm cycles through steps 1 and 2 until cluster means do not change beyond a threshold
- Solutions may only be locally and not globally optimal

$$d(\mathbf{x}, \mathbf{y}) = \sqrt{\sum_{i=1}^n (x_i - x_j)^2}$$

Other Cluster Solutions



- Hierarchical Clustering
- Automatically determines number of clusters
- Computationally intensive
- Can be used prior to a k-means
- Agglomerative starts with each student in own cluster and then pairs iteratively up a hierarchy
- Divisive starts with all students in a single cluster and splits into clusters down a hierarchy
- Common approach is Euclidean distance using Ward's method (agglomerative)

Other Classification Techniques

- Regression (linear, polynomial, logistic, etc.)
- Structural equation modeling
- Classification and regression trees (CART)
- Neural networks
- Bayesian networks
- Support vector machines
- Other machine learning/data mining models
- Others

Key Definitions

Completion

- Associate's degree
- Certificate
- Transfer

First-Time Student

- Had not previously attended college
- Was not co-enrolled in high school or a four-year institution

Accounted for 70% of students who entered system in fall 2001 and attempted four-fifths of units in 2001-2002



The Clusters

Completion-Directed Pathways

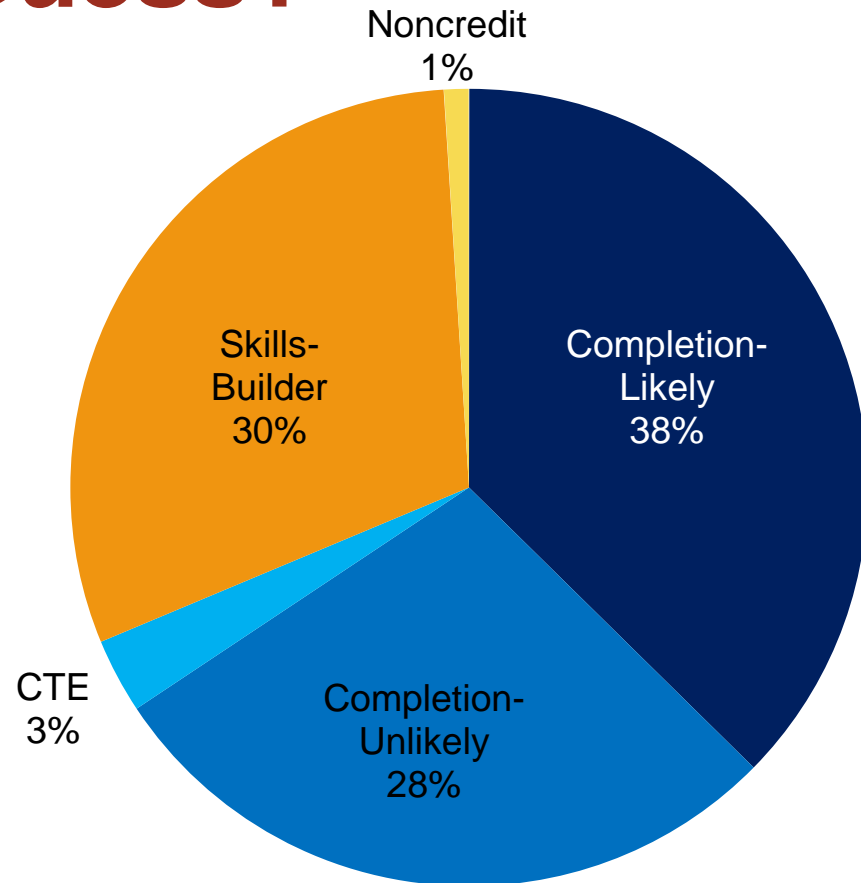
- Completion Likely (2 subgroups)
- Completion Unlikely
- CTE

Non-Completion Pathways

- Skills-Builders
- Noncredit

Statewide Averages- What's Your Guess?

*Bahr found
that
averages
varied by
college*



First-Time Student Types, Based on Headcount

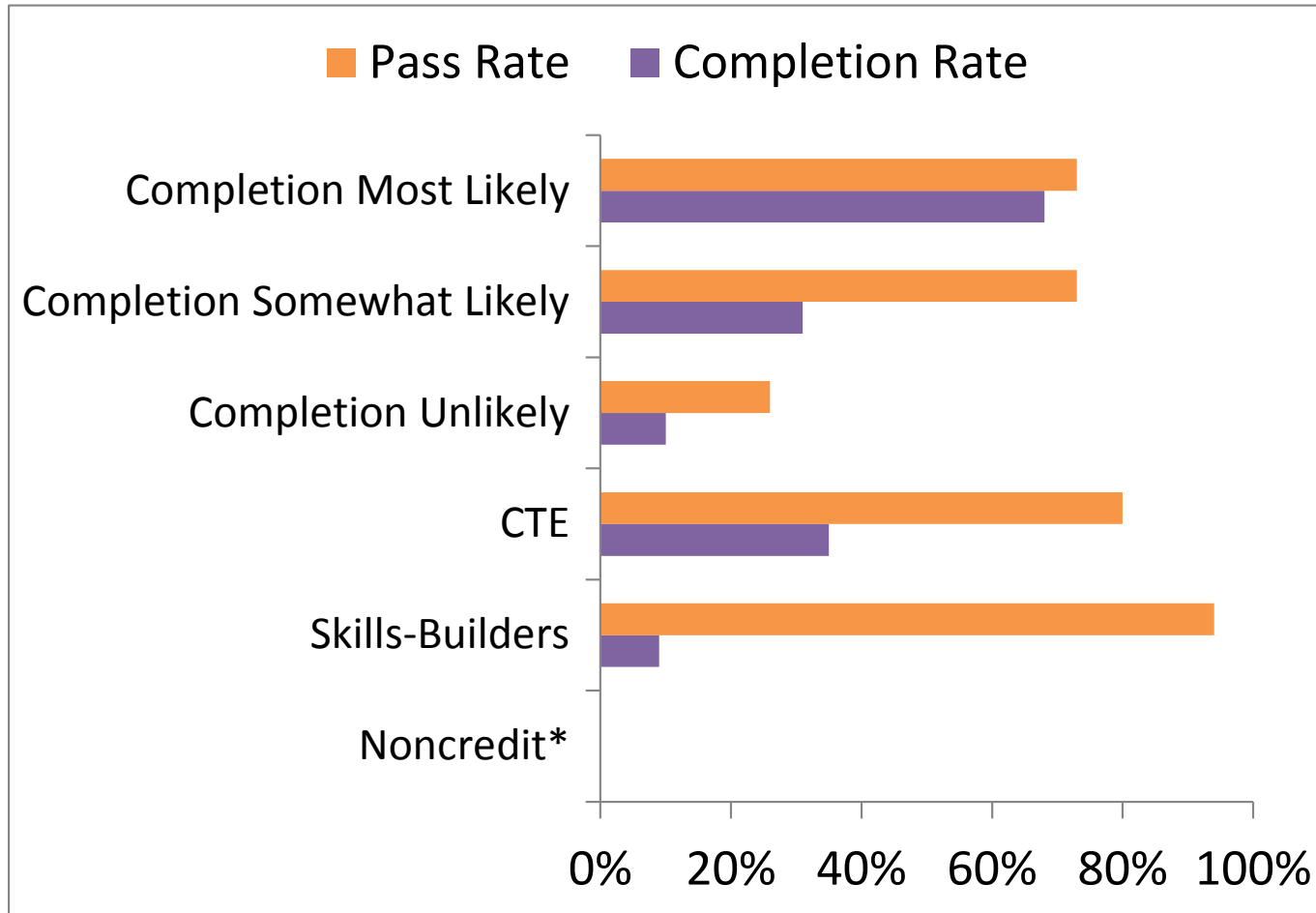
Cluster Naming Crosswalk

Original Name in Article	Name in Brief and Presentation
Transfer	Completion Most Likely
Exploratory	Completion Somewhat Likely
Experimental	Completion Unlikely
Vocational	CTE
Drop-In	Skills Builders
Noncredit	Noncredit

Means of Key Variables by Classification

Note: Values in this table are updated since article publication	Completion Most Likely	Completion Somewhat Likely	Completion Unlikely	CTE	Skills Builders	Noncredit
Total Units Attempted	122	66	15	81	7	25
Math Core Units Attempted	20	9	2	4	0	3
English Core Units Attempted	14	8	2	4	1	3
Transferrable Physical/Life Science Units Attempted	13	4	0	3	0	1
Transferrable Social/Behavioral Science Units Attempted	23	12	2	5	1	3
Transferrable Humanities Units Attempted	20	11	2	4	1	3
Transferrable Vocational Units Attempted	19	13	3	11	2	4
Non-Transferrable Vocational Units Attempted	2	2	1	43	1	2
Total Noncredit Courses	4	1	0	2	1	25
Course Success Rate	73%	70%	24%	80%	93%	95%
Number of Terms Enrolled	13	7	2	9	2	13
Number of Years Enrolled	6	4	2	5	2	6
Mean Number of Units Attempted per Regular Term	11	11	7	10	3	2
N	28,320	46,518	56,064	5,704	65,229	2,541
% of FT Cohort	14%	23%	27%	3%	32%	1%

Comparison of Pass and Completion Rates Among Clusters



Ethnicity of Classifications

Ethnicity	Completion Most Likely	Completion Somewhat Likely	Completion Unlikely	CTE	Skills Builders	Noncredit
White	37%	45%	38%	43%	42%	39%
Afr Am	6%	7%	11%	7%	6%	2%
Hisp	32%	27%	34%	35%	30%	27%
Asian	13%	9%	6%	6%	8%	11%
Pac Isl	0.8%	0.9%	0.9%	0.7%	0.6%	0.3%
Filipino	6%	4%	3%	3%	2%	1%
Nat Am	0.8%	1.0%	1.4%	1.1%	1.0%	0.4%
Unknown	5%	5%	5%	4%	10%	18%
Total	100%	100%	100%	100%	100%	100%

Completion-Likely Continuum

Students Most Likely to Complete

- Enroll full time, stay about 6 years
- Attempt an average of 123 credits in transferable courses
- Pass 73% of courses and have high completion rates (68%)

Students Somewhat Likely to Complete

- Enroll full time, stay about 4 years
- Attempt 66 transferrable credits, but fewer math, physical & life sciences credits
- Pass 73% of courses, but have low completion rates (31%)

Completion Directed

Completion Unlikely

- Enroll part time, attend intermittently, stay about 2 years
- Attempt 16 transferable credits, with more in CTE
- Pass 26% of courses and have very low completion rates (10%)
- Overrepresented by African American, Hispanic, Native American, and Pacific Islander students

Career Technical Education Students

- Enroll full time, stay about 5 years
- Attempt 82 units in commercial services, engineering and industrial technologies, health fields and public and protective services
- Pass 80% of courses, but have low completion rates (35%)

Non-Completion Pathways

Skills-Builder Students

- Take one course a year for two years, on average
- Attempt 7 credits in transferable humanities and CTE, especially engineering and industrial technologies
- Pass 94% of courses, but have very low completion rates (9%)

Noncredit Students

- Enroll in about three courses each year for five years
- Take ESL, short-term vocational programs, health and safety education and programs for older adults
- Course completion data not available

Cluster Stability

- Bahr tested 5 to 15 cluster solutions and found CTE, Skills Builders, and Noncredit to be the most stable
- A two year tracking window with the Fall 2001 cohort showed similar cluster solutions
- A six year tracking window with a Fall 2002 cohort showed similar cluster solutions

What about those “Non-Completers”?

- A preliminary analysis of UI wage data found wage increases for skills-builder students
- The CTE Employment Outcomes survey found significant wage gains for non-completers (26% increase in hourly wage for non-completers; 39% for completers)
- There are pathways through our colleges that we aren't documenting or measuring

Bringing Bahr's Analysis Home

- You can download a summary of Bahr's study from the RP Group or LearningWorks sites
- You can download instructions on how to replicate this study locally, using a guide that also includes discussion questions
- The RP Group is offering technical support on implementing the study
- Bahr is conducting a detailed wage analysis for non-completers, including mapping common course-taking pathways—watch for results in spring 2013

Find Out More

Summary of the Bahr Study & Implementation Guide

<http://www.rpgroup.org/projects/completion>

Terrence Willett, Course-taking Analysis Support

twillett@rpgroup.org

Kathy Booth, Statewide Success Conversations

kbooth@rpgroup.org