Student Achievement Database: Exploring Precollege Mathematics Achievement

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Abstract

The SBCTC developed the Student Achievement Database as an alternative means of measuring student achievement based on the notions of momentum points and tipping points. This presentation focuses on research underlying the creation of the database, variables related to mathematics achievement, strengths and limitations of the database, and a framework for analyzing student achievement in mathematics conducted at Highline Community College.

Outline of presentation

I. Conceptual framework for the database
II. Variables of interest
III. Highline's analysis of the data

I. Conceptual Framework

The "Tipping Point" research

http://www.sbctc.ctc.edu/docs/data/research_reports/resh_06-2_tipping_point.pdf

"Compared with students who earned fewer than ten college credits, those who took at least one year's worth of college-credit courses and earned a credential had an average annual earnings advantage: $7,000 for students who started in ESL; $8,500 for those who started in ABE or GED; and $2,700 and $1,700 for those entering with a GED or high school diploma, respectively." (*Tipping Point*, p. 3)

"This study of students in the Washington State Community and Technical College system finds evidence that attending college for at least one year and earning a credential provides a substantial boost in earnings for adults with a high school diploma or less who enter higher education through a community college. These findings are consistent with studies that have used nationally representative samples of community college students. […] The findings from all of these studies of Washington State indicate that community and technical colleges should consider making at least one year of college-level courses and earning a credential a minimum goal for the many low-skill adults they serve."(p. 5)

Momentum Points as a Means of Moving Students Towards "Tipping."

The current Student Achievement Database contains three years of data (2005-06, 2006-07, 2007-08). The database tracks when students achieve identified "momentum points" during a given academic year. The momentum points include: completing pre-college math credits, pre-college English credits, 5-credit college-level quantitative or computation course, 15 of 30 college-level credits, and receives a degree or certificate. The data can be analyzed with EXCEL, SPSS, or MS Access.

Student Achievement Database website: http://www.sbctc.ctc.edu/college/e_studentachievement.aspx
Data dictionary: http://www.sbctc.ctc.edu/college/_d_datawarehouse.aspx

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II. Variables of Interest for Mathematics

Table 1 shows the variables of interest related to mathematics.

Variable name	Variable description	Scale
CollegeReadyMath_Attempted	Indicates if the student enrolled and attempted any pre-college math course.	0 – no, 1 – yes
CollegeReady PreMath_Points	One point each time the student earns any pre-college math credit at the college's qualifying grade point for moving to the next level.	0, 1, 2, 3
QuantCourse_Point	Earned when a student earns at least 5 college credits in college level computation (technical programs) or quantitative reasoning (math/logic) classes in the system.	0 – no, 1 – yes
QuantCoursesEarnedPrior	Indicates whether a student earned 5 quant credits prior to academic year in system.	0 – no, 1 – yes
15ClvlCr_Point	Earned if student achieves 15 college-level credits.	0 – no, 1 – yes
30ClvlCr_Point	Earned if student achieves 30 college-level credits.	0 – no, 1 – yes
TippingPoint	Earned when student receives a certificate, degrees or apprenticeship award by end of year. Certain certificates also require student to have earned at least 45 college level credits.	0 – no 1- yes

The database also includes demographic variables, such as: Purpose of Attending (transfer, prof-tech, enrichment), Student ID, gender, race/ethnicity, SES, FT/PT, disability status, Running-Start status, prior educational attainment.

III. Analysis of Mathematics Attainment at Highline

This analysis was conducted using the statistical software SPSS. Table 2 shows the percentage of students, by cohort, who attained and attempted mathematics momentum points. I omitted 5045 (11%) students who had previously earned five college-level quantitative credits. The remaining students are considered eligible for precollege mathematics momentum points [PcMP].

Table 2: Variables of Interest in the Student Achievement Database for students eligible to earn precollege math momentum points, by cohort.

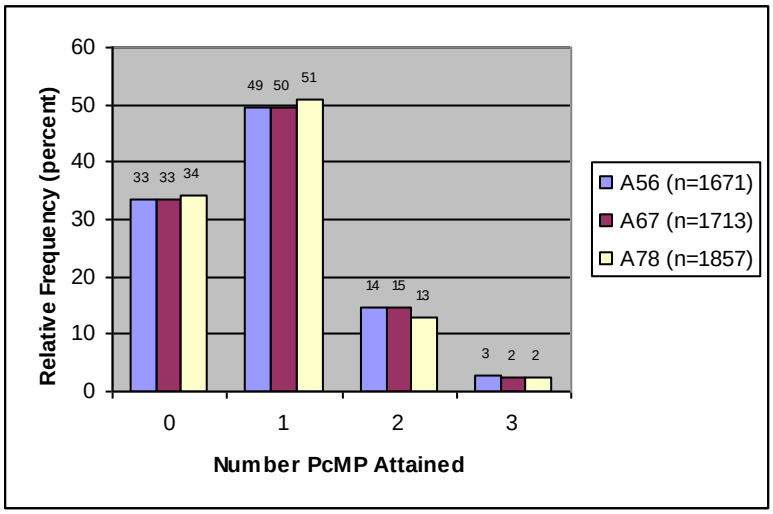
	2005-06 (*n* = 13028)	**2006-07 (*n* = 13761)**	**2007-08 (*n* = 14370)**
Attained 5-credits college-level quantitative credits	9%	9%	9%
Attempted precollege math momentum points (PcMP)	13%	12%	13%
Attained at least one precollege math momentum point (PcMP)	9%	8%	9%

While it might be tempting to limit the analysis to transfer or professional-technical students, subsequent exploration using the variable LastPurpAttd revealed that many types of students attempt and/or achieve these momentum points.

NOTE: The data must be analyzed by cohort.

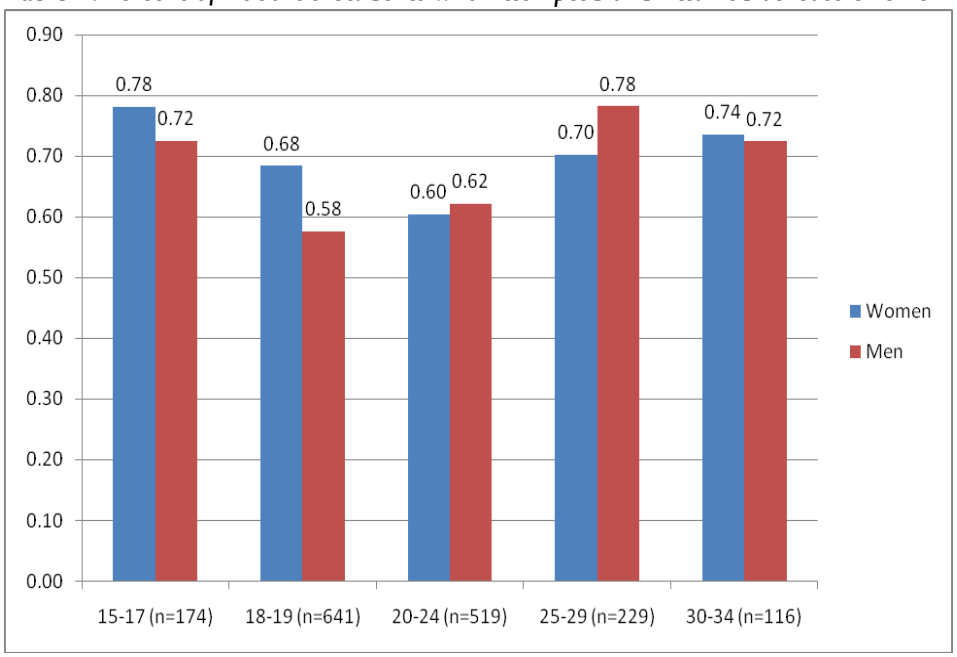
Working with our Achieving the Dream Data Team, I decided to focus on eligible students who attempted PcMP (*n* = 5241). Table 3 shows a relatively stable pattern. In each cohort, roughly one third of the students attempted but attained no PcMP while half the students attained 1 PcMP.

Table 3: *Percent of students attempting and attaining from 0-3 PcMP, by cohort*



I decided to explore the group of students who attempted and attained at least one PcMP in the academic year, by subgroup. To provide a flavor for these results, I present in Table 4 the distribution by age and gender for the A0708 cohort for limited age groups. Across the three cohort groups, the only obvious trend was lower success by male students in the 18-24 year age groups and students of both genders in the 20-24 year age group. It is untested whether these differences are statistically significant.

Table 4: *Percent of 2007-08 Students who Attempted and Attained at least One PcMP, by Gender and Age*



LIMITATION: The "attempted" variable (CollegeReady PreMath_Attempted) is dichotomous (0 – no, 1 – yes). There is no way to determine how many attempts a student made.

To remedy the limitation on the "attempted" variable, a member of the data team used transcript data to create an "attempted" variable that indicates the number of times a student attempted a precollege mathematics course within a given year The shaded cells in Table 5 indicate "successes"—that is, when a student achieves as many precollege mathematics courses as they attempt. For the 2007-08 cohort, of students who made one attempt (n=1256), 56% attained one PcMP. Of students who made two attempts (n=469), 42% attained 2 PcMP. Of students who made three attempts (n=117), 35% attained 3 PcMP.

Table 5: *PcMP Attempted and Attained Data for 2007-08 cohort*

	Precollege Math Momentum Points Attained				
# Attempts	0	1	2	3	Total
1	557 (44%)	699 (56%)*	0	0	1256
2	65 (14%)	208 (44%)	196 (42%)*	0	469
3	7 (6%)	30 (26%)	39 (33%)	41 (35%)*	117
4	0	6 (60%)	2 (20%)	2 (20%)	10
Total	629	943	237	43	1852

For purpose of institutional initiatives, Highline plans to use the "one-one" group—one attempt and one attained—as an indicator that can be tracked over time and can reveal improvements in mathematics success. This percentage has been relatively stable for the 2005-06 (58%), 2006-07 (56%) and 2007-08 (56%) cohorts. Subsequent exploration will focus on subgroup analysis of the one-one group in order to suggest student groups who need attention or more support. Table 6 and 7 provide a flavor of this and shows the one-one group in 2007-08 broken down by gender and several age groups as well as a math achievement "dashboard" being used to track specific groups of interest.

Table 6: *2007-08 Students who Attempted Once and Attained One PcMP, by gender and age.*

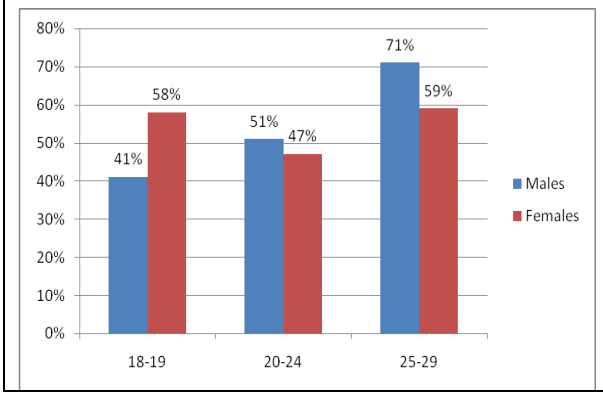


Table 7: *Student Achievement Dashboard: Math Achievement Subgroups of Interest*

	A0506	A0607	A0708
18-19 Males	51%	47%	41%
3-levels below in math	50%	48%	53%
Hispanic/Latino	53%	46%	46%
African American	46%	47%	49%
25-29 Females	67%	67%	

Additional variables Highline has added to our Student Achievement Database include: Highest math, reading, and writing placement (1, 2, or 3 levels below college) and MP311 status (students placing 3-levels below college in mathematics and 1 level below college in either reading or writing.

The value to me of the Student Achievement Database is that it broadens focus from single courses to overall course-taking patterns that can be tracked over time. If you are interested in exploring ways to use the Database within your department, I'm happy to help with that effort.