

What Adds Up?

Executive Summary

College students struggling to pass a college level math course required for Quantitative Literacy (QL) credit¹ has been a common issue facing many institutions in higher education. In the fall of 2014, the Utah State Board of Regents solidified a statewide initiative that set goals for each of the Utah System of Higher Education institutions (UU, USU, WSU, SUU, SNOW, DSU, UVU, and SLCC) to improve their students' success rates in earning Quantitative Literacy (QL) credit¹. This report seeks to provide a more comprehensive understanding of what Utah students are experiencing in their journey to earn QL credit.

This report focuses on 14,938 first time students who enrolled within 12 months of high school graduation (i.e. *FH students*) at one of the public higher education institutions during Fall 2007-Spring 2008. This analysis followed these students from their initial enrollment through the end of academic year 2013.

This report consists of two parts: (1) descriptive information focusing on students' math enrollment patterns and outcomes; (2) information focused on student disposition in 2013 broken out by their math enrollment patterns.

Navigating this Report

This report enables readers to 'click through' various aspects to retrieve additional information. By clicking on an element in *Bold Italics*, the reader can access additional information. Additionally, a series of *Quick Links* are provided next to the Table of Contents. Finally, pages with charts include links at the bottom which will take the reader back to an earlier page or to the Definitions page.

Key Findings (Click on finding to see additional information)

- The largest math enrollment pattern of students in the FH 2008 cohort was students who took Math 1010 or a lower math course (6,977 students or 46.7% of the 2008 FH cohort).
- Students who took Math 1010 or a lower math course prior to earning their QL credit can and do succeed.
 - Of the 2,902 students from the FH 2008 cohort who earned a Bachelor's or higher degree, 958 (or 33.0%) started their math journey in a Math 1010 or lower math course.
 - Of the 3,188 Associate's degrees earned, 1,454 (or 45.6%) award recipients took a Math 1010 or lower math course.
- Substantial differences persist between math enrollment patterns.
 - Students enrolling in Math 1010 or a lower math course are less likely to have earned a degree or certificate by the end of 2013.
 - Students who took Math 1010 or a lower math course are more likely to leave higher education without receiving a degree or certificate before the 2013 academic year.
 - Considerable difference in outcomes exist between students who enroll in Math 1010 and students who enroll in a lower math course.
- Students who do not enroll in math courses are at considerable risk of leaving higher education without receiving a degree or certificate.

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Quick Links

Overall



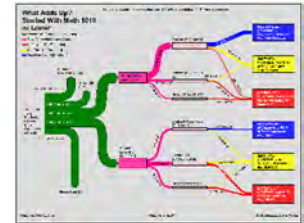
Earned QL Credit via CE or AP/ACT



Started with Math 1030 or Higher



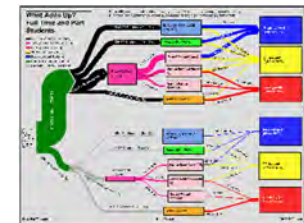
Started With Math 1010 or Lower



Never Took Math



Full vs. Part Time Students



Introduction

College students struggling to pass a college level math course required for Quantitative Literacy (QL) credit¹ has been a common issue facing many institutions in higher education. For instance, Complete College America referred to the struggle many students face in preparing for or taking such a course as part of “higher education’s “Bridge to Nowhere””² and continually prescribes changes to math courses to help improve student completion³. Not surprisingly, Utah’s education leaders and practitioners have looked for just such improvement from their higher education institutions. In the fall of 2014, the Utah State Board of Regents solidified a statewide initiative that set goals for each of the Utah System of Higher Education institutions (UU, USU, WSU, SUU, SNOW, DSU, UVU, and SLCC; or ‘USHE’ for short) to improve their students’ success rates in earning QL credit.

Many education leaders and practitioners have discussed the need for improving students’ ability to earn their QL credit and go on to earn their degree. It is important to understand what this process looks like at Utah’s public institutions and for their students today. This report provides a more comprehensive picture of what Utah students experience and helps illustrate potential opportunities for improvement.

What you will find in this report

This document presents various data visualizations describing Utah public college students’ experiences with earning QL credit and degree completion.

This report focused on 14,938 first time students who enrolled within 12 months of high school graduation (FH students) at one of the Utah public higher education institutions (UU, USU,

WSU, SNOW, SUU, DSU, UVU, and SLCC) during Fall 2007-Spring 2008. This analysis followed these students from their initial enrollment through the end of academic year 2013.

This report grouped the students into one of the following five math enrollment patterns: 1) those who earned their QL credit via Concurrent Enrollment (CE) or AP or ACT test results prior to higher education enrollment; 2) those who passed a QL math course without taking a Math 1010 or lower math course; 3) those who took a Math 1010 course but not a lower math course; 4) those who took a course that was lower than Math 1010; and 5) those who did not take any math courses. For clarity, this report often combines the two groups of “took Math 1010” and “took a class lower than Math 1010” as a single group referred to as “Took Math 1010 or Lower”.

This analysis tracked students’ progress from 2007-08 through 2012-13. Each student was categorized at the end of 2012-13 as being in one of three groups: 1) those who received an award; 2) those who were still enrolled and working toward a degree; or 3) those who left higher education.

Additionally, by utilizing the data available through the *Utah Data Alliance*⁴ this report follows these students from their high school enrollment (available for USOE graduates), across their enrollment in multiple USHE institutions (if applicable), and through their graduation from a USHE or non-USHE institution (available for former USOE students).

This report consists of two parts: (1) descriptive information focusing on students’ math enrollment patterns and outcomes; (2) information focused on student disposition in 2013 broken out by their math enrollment patterns.

Additional Considerations: Why Students Leave Higher Education, Predicting QL Success, Utah Adoption of Common Core Curriculum and SB196

In presenting the information in this report, it became evident that several additional issues need to be addressed. Most notably, the following content of this report does not intend to discuss why students are leaving higher education nor does it intend to make it appear that students who struggle in earning their QL credit are destined to leave higher education. Students may decide to leave higher education for many reasons. As a 2006 National Postsecondary Education Cooperative report emphasizes, no one reason can explain student attrition; however the most common sources include lack of parental or peer support and financial considerations.⁵ A 2012 report from National Center for Education Statistics analyzed a starting cohort of students from the 2003-04 academic year. In focusing in on the ~16% of students who left in 2004, “Academic Problems” ranked 6th in most frequently cited reasons for leaving without completing. “Personal Reasons,” “Financial Reasons,” and “Other Reasons” were the top three most cited reasons for leaving higher education.⁶

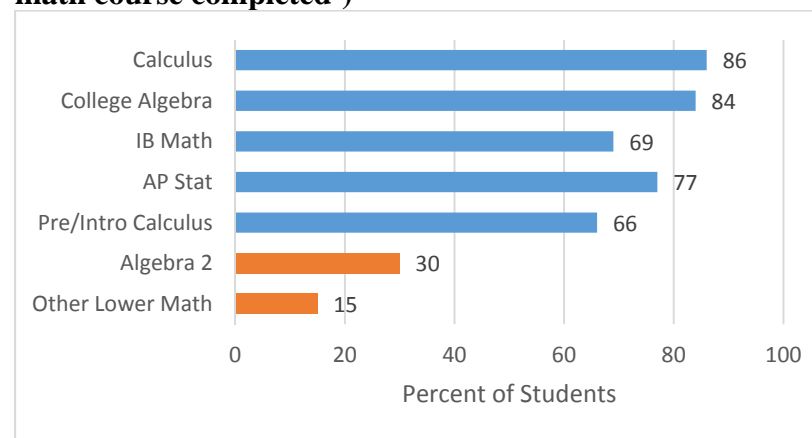
While *What Adds Up?* focuses explaining how students earn their QL credit, several elements in this report do speak to student attrition. First, students who do start in remedial math courses can and do ultimately succeed in earning their degrees (pages 7 and 9). Not surprising, students who start in lower remedial math class (courses lower than 1010) do appear to have a steeper hill to climb toward degree completion (pages 7 and 9). Reinforcing the notion that earning QL credit is not a primary explanation for students deciding to leave higher

education, a certain number students who have earned their QL credit still decide to leave higher education (pages 5, 6, and 7).

Beyond QL math completion, additional research was conducted to identify key behaviors of incoming students that could help predict student success in earning their QL credit. In examining several factors for their impact, the following two stood out the most: students taking advantage of rigorous high school math courses and students enrolling in math during first year in higher education.

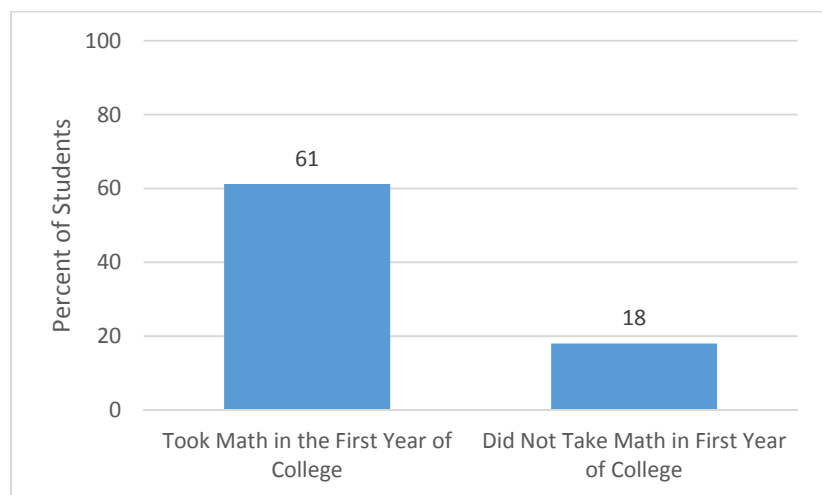
In an analysis of 57,090 FH students at USHE campuses from 2008 to 2012, a very clear distinction on students’ likelihood of earning their QL based on the last high school math class they took became quite evident. This analysis emphasizes the need for students who are considering enrolling in higher education to take as much math and the most rigorous math courses they can.

Percentage of USHE Students Who Complete QL Requirement (categorized by the most recent High School math course completed⁷)



Additionally, once students enroll in college, research has shown enrolling in math during their first year is a critical indicator of students' likelihood to earn QL credit. In an analysis of 12,110 FH students from 2008 who had not previously earned QL prior to enrollment at one of the USHE institutions, it was found that taking any math class (QL credit bearing or remedial) their first year more than tripled the student's likelihood of earning their QL credit within five years compared to students who did not take math their first year.

Passed Math 1030 or higher within 5 years after High School Graduation



While lessons can still be learned from the experiences of students who started in 2008, two systemic changes have occurred in recent years that might impact the various pathways and processes described in this report. First, in 2010 the Utah System of Education (USOE, the state agency that

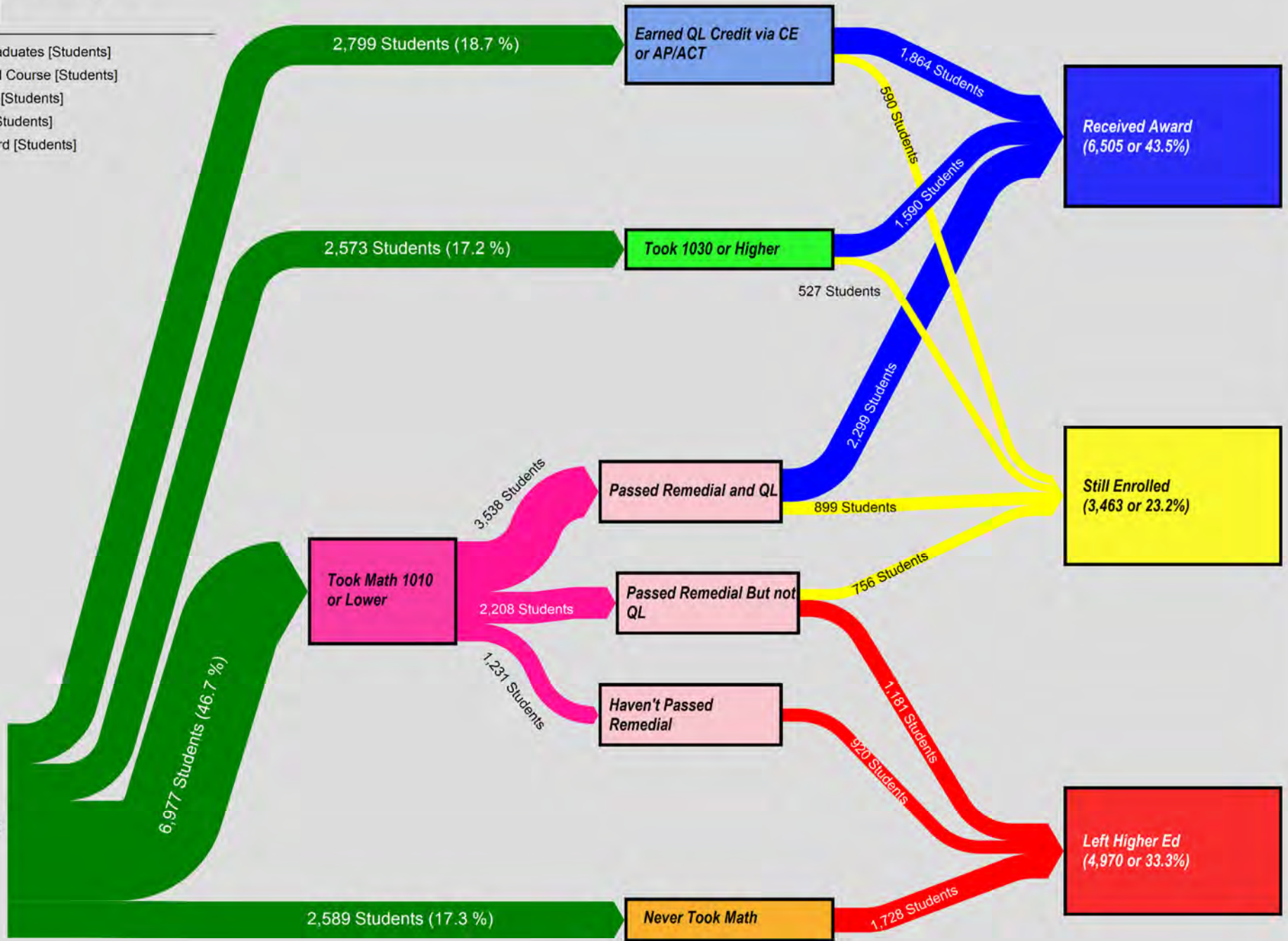
oversees public K-12 education) adopted the Common Core curriculum with course implementation starting in 2012. This curriculum change will systematically update not just what is taught but how it is taught in Utah public schools. While the students in this report were admitted into Utah's higher education system years before this adoption, it is important to keep in mind that much of what is described in this report would be subject to change as this curriculum is adopted across the state and those students matriculate into USHE institutions.

Similarly, in 2015 the Utah state legislature and Governor passed and signed Senate Bill 196 "" which created additional math preparation standards for high school graduation. This bill seeks to improve the math preparation of higher education bound students. Key provisions in this legislation include the requirement for high school students 'pursuing a college degree' to earn USHE QL credit prior to high school graduation.⁸ While much work is still being done to bring Utah higher education and public high schools into compliance with this new law, the resulting changes may also impact FH students QL pathways and outcomes.

What Adds Up? Overall

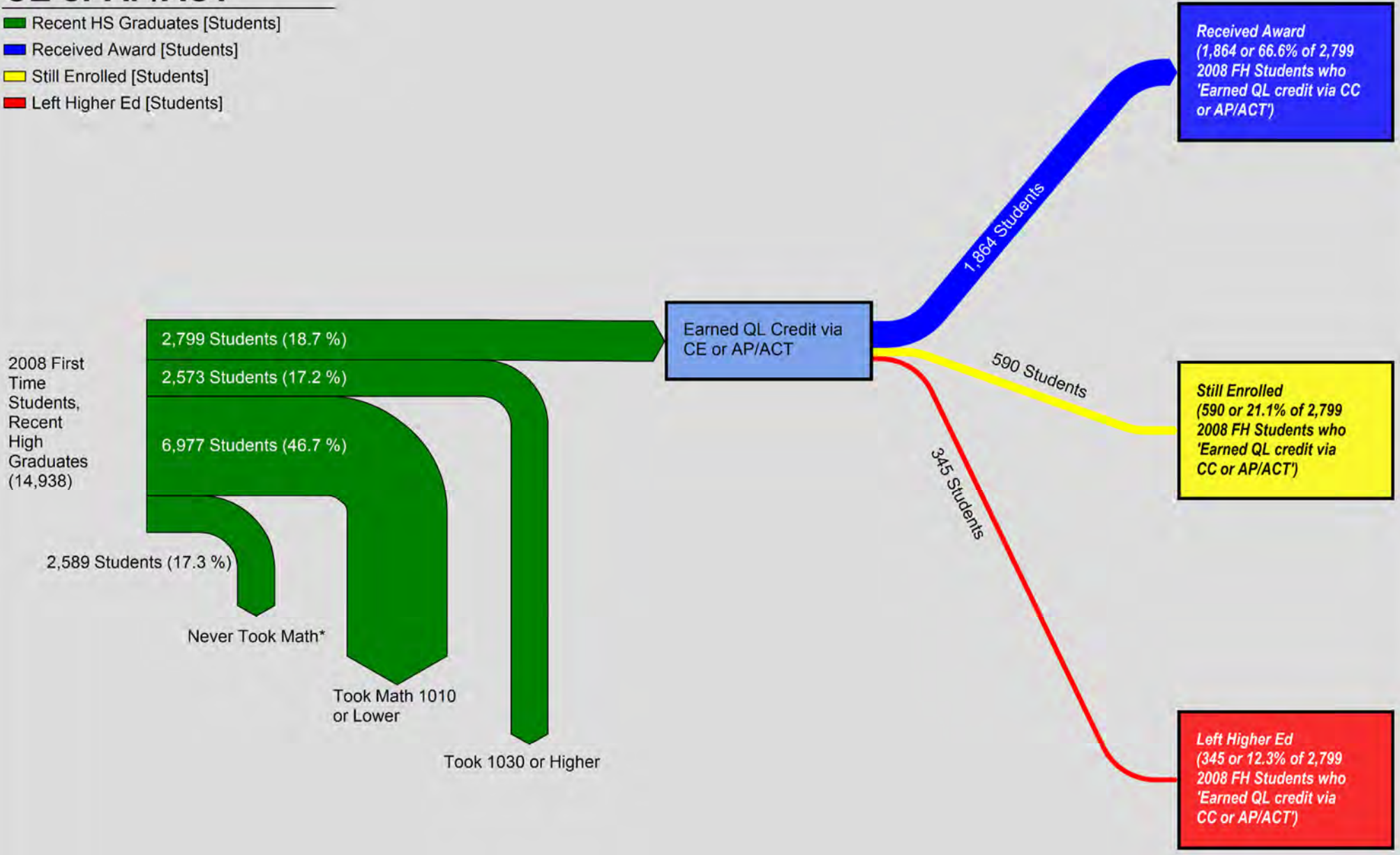
For clarity, student flows with less than ~3% of total population (460) were suppressed.

- █ Recent HS Graduates [Students]
- █ Took Remedial Course [Students]
- █ Left Higher Ed [Students]
- █ Still Enrolled [Students]
- █ Received Award [Students]



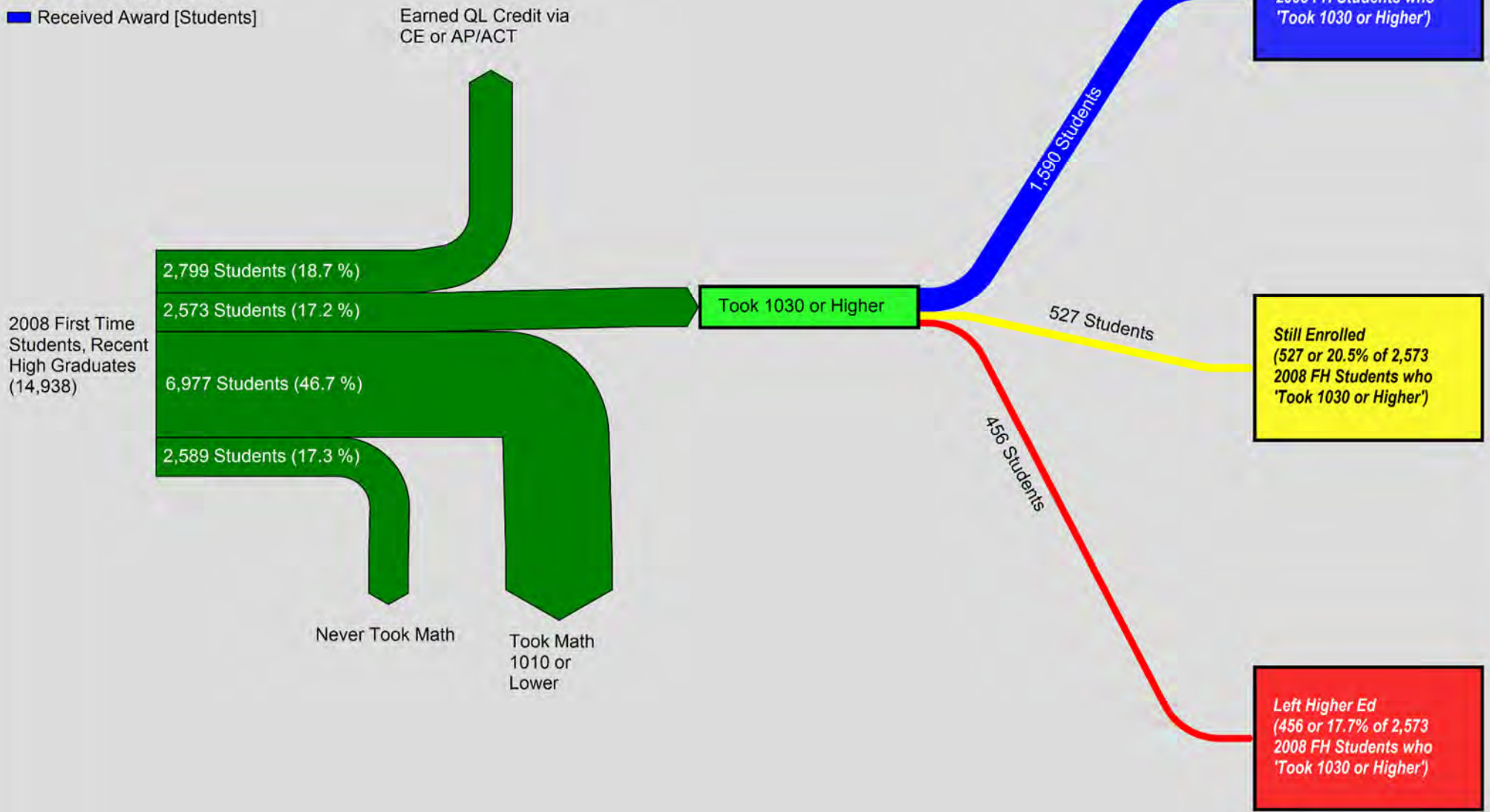
What Adds Up? Earned QL Credit via CE or AP/ACT

- Recent HS Graduates [Students]
- Received Award [Students]
- Still Enrolled [Students]
- Left Higher Ed [Students]



What Adds Up? Started with Math 1030 or Higher

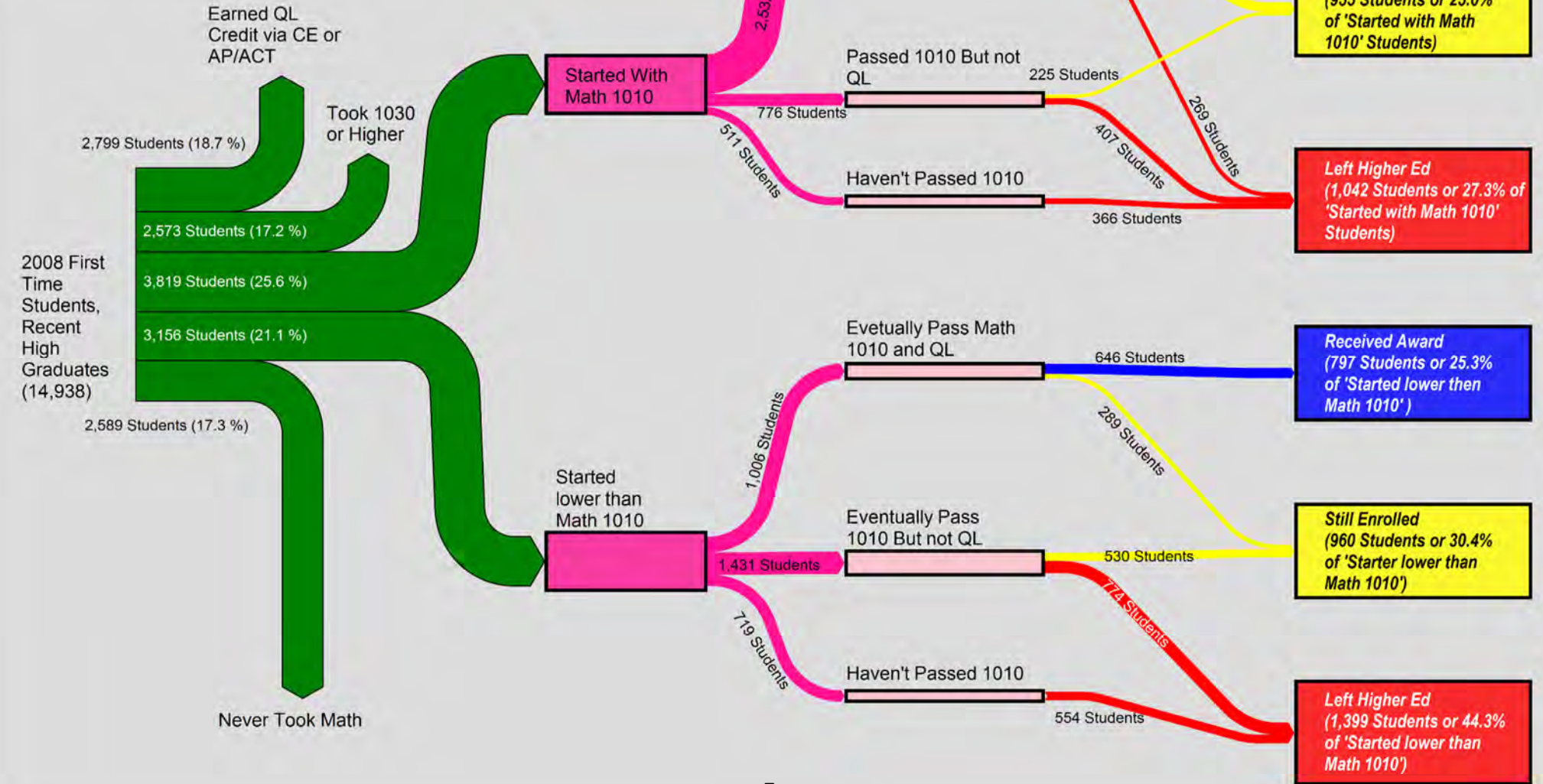
- █ Recent HS Graduates [Students]
- █ Left Higher Ed [Students]
- █ Still Enrolled [Students]
- █ Received Award [Students]



What Adds Up? Started With Math 1010 or Lower

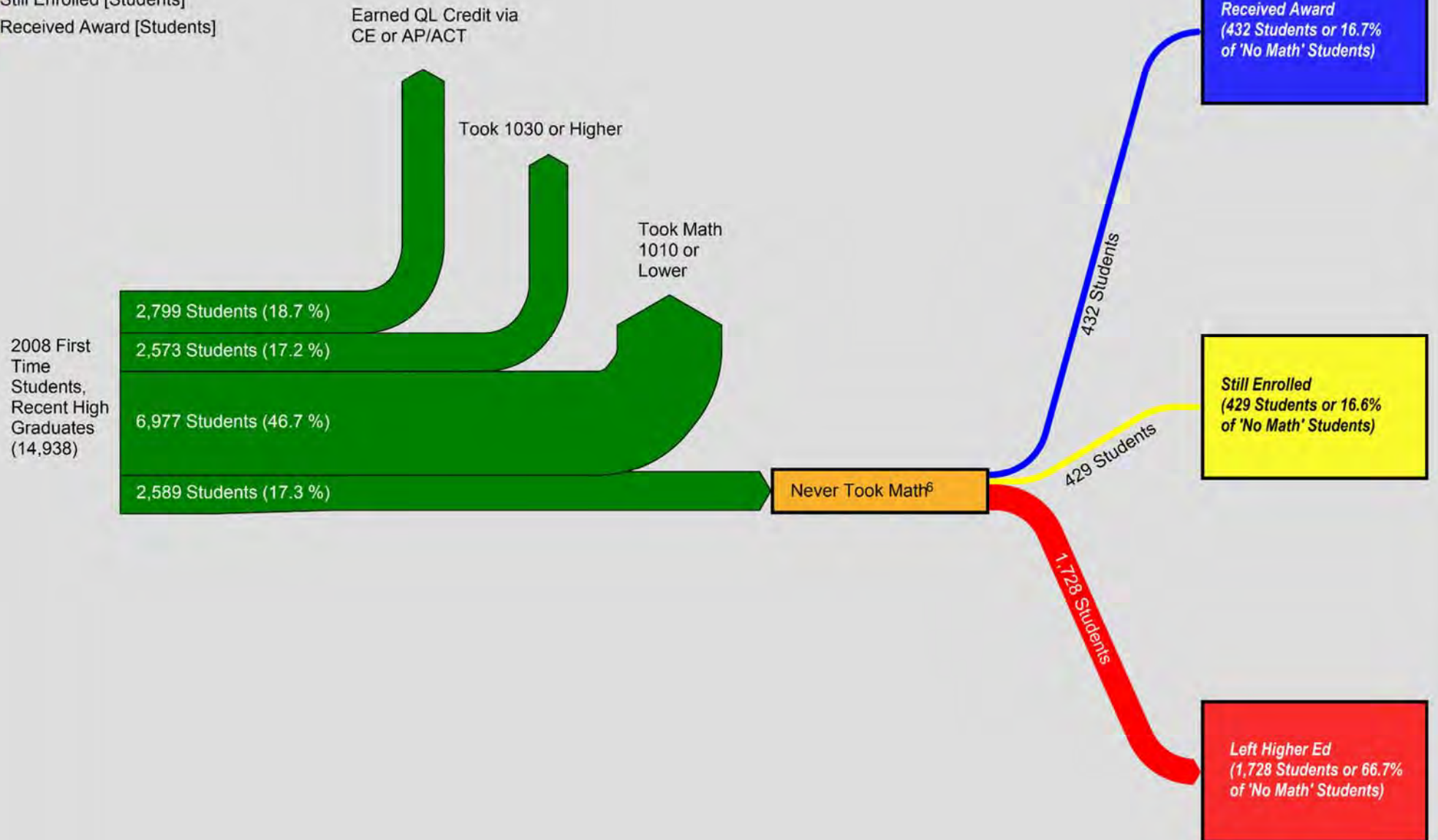
For clarity, student flows with less than 1% of total population (149) were suppressed.

- █ Recent HS Graduates [Students]
- █ Took Remedial Course [Students]
- █ Left Higher Ed [Students]
- █ Still Enrolled [Students]
- █ Received Award [Students]



What Adds Up? Never Took Math

- Recent HS Graduates [Students]
- Left Higher Ed [Students]
- Still Enrolled [Students]
- Received Award [Students]



What Adds Up? Full Time and Part Students

Full time and part time status was determined by student's FH term record (12+ hours = Full Time, 11 and fewer hours = Part Time). For clarity, certain small student flows (typically ~2% or less) were suppressed. Student group's top 1 or 2 flows were not suppressed, regardless of size.

- Full Time Student [FT Students]
- Took Remedial Course [Students]
- Left Higher Ed [Students]
- Still Enrolled [Students]
- Received Award [Students]
- Recent HS Graduates [Students]
- Part Time Students [PT Students]

2008 First Time Students, Recent High School Graduates (14,938)

3,071 Students (20.6%)

11,867 Students (79.4%)

5,289 FT Students (44.6%)

Took Math 1010 or Lower

1,670 FT Students (14.1%)

Took Math 1010 or Lower

919 PT Students (30.0%)

1,688 PT Students (55.0%)

296 PT Students (9.6%)

168 PT Students (5.5%)

Earned QL Credit via CE or AP/ACT

Took 1030 or Higher

Passed Remedial and QL

Passed Remedial But not QL

Haven't Passed Remedial

Never Took Math

Earned QL Credit via CE or AP/ACT

Took 1030 or Higher

Passed Remedial and QL

Passed Remedial But not QL

Haven't Passed Remedial

Never Took Math

Received Award (5,853 or 49.3%)

Still Enrolled (2,556 or 21.5%)

Left Higher Ed (3,458 or 29.1%)

Received Award (652 or 21.2%)

Still Enrolled (907 or 29.5%)

Left Higher Ed (1,512 or 49.2%)

2,503 FT Students (21.1%)

2,405 FT Students (20.3%)

2,727 Students

1,633 Students

864 Students

1,670 FT Students (14.1%)

608 Students

680 Students

400 Students

1,590 Students

1,313 Students

1,629 Students

822 Students

681 Students

612 Students

377 Students

1,059 Students

131 Students

74 Students

317 Students

229 Students

295 Students

697 Students

832 Students

792 Students

787 Students

787 Students

787 Students

1,059 Students

88 Students

59 Students

271 Students

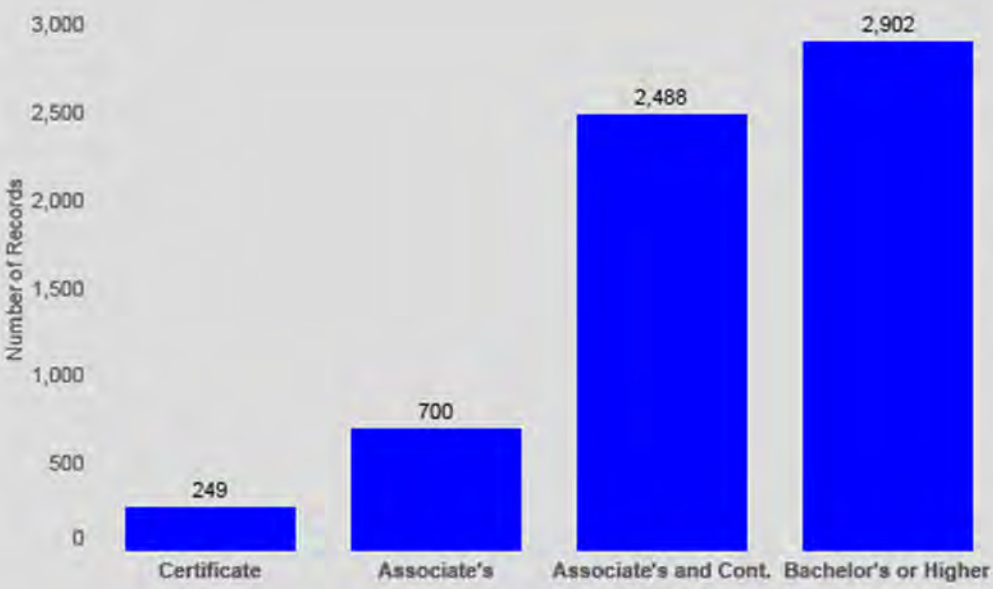
271 Students

346 Students

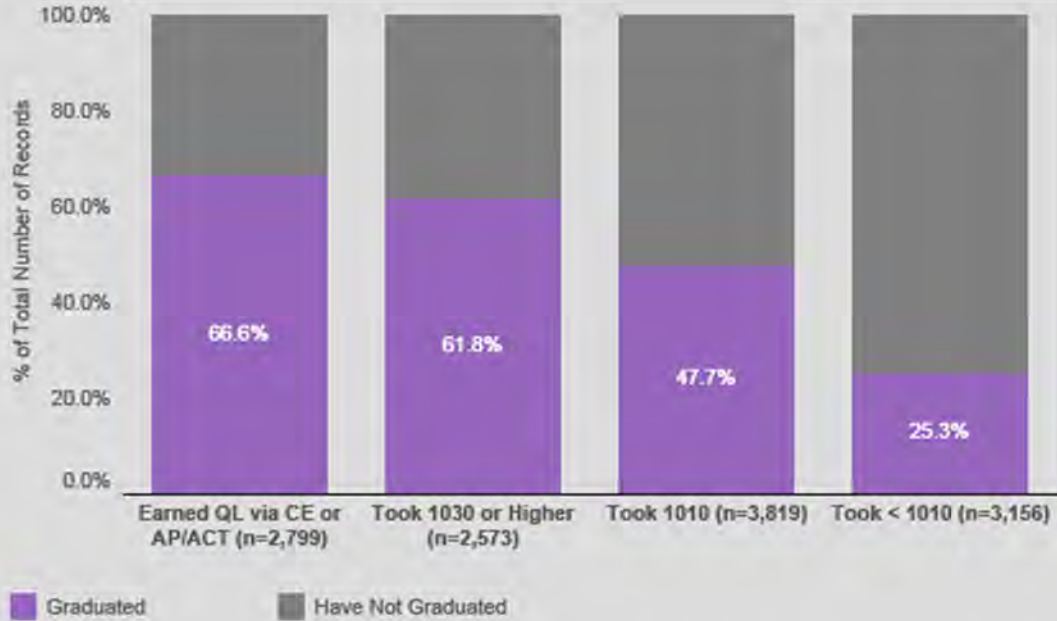
What Adds Up?

Additional Received Award Information

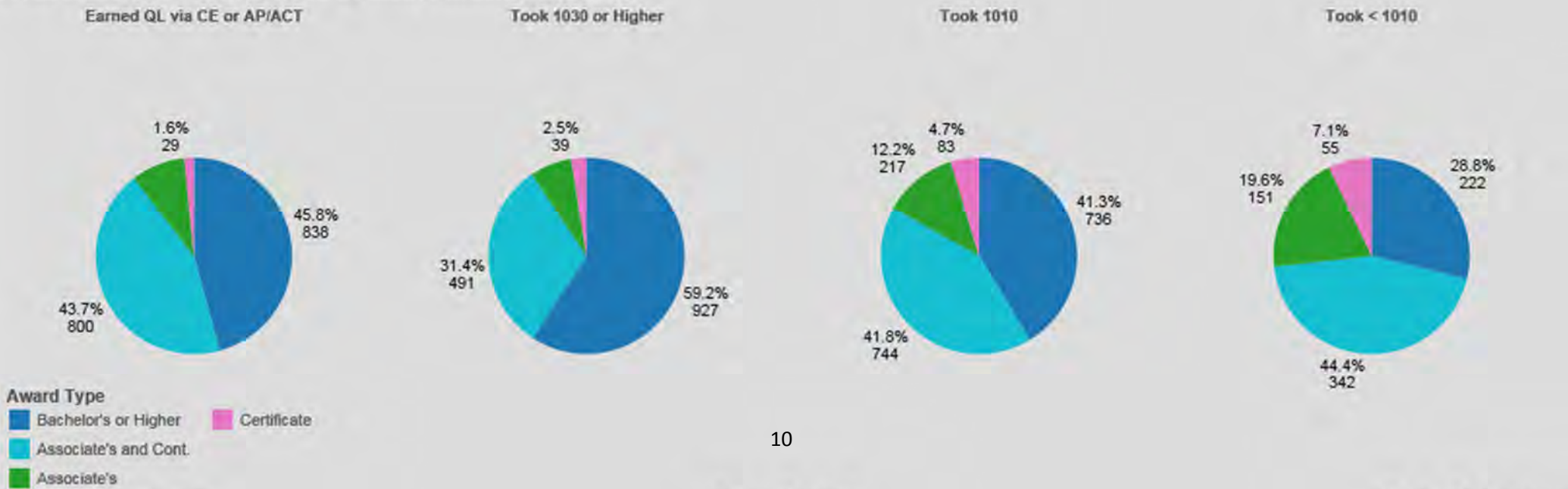
FH 2008 Cohort Completions



FH 2008 Cohort Completion Rate by Math Enrollment Pattern



FH 2008 Cohort - Completions by Math Enrollment Pattern

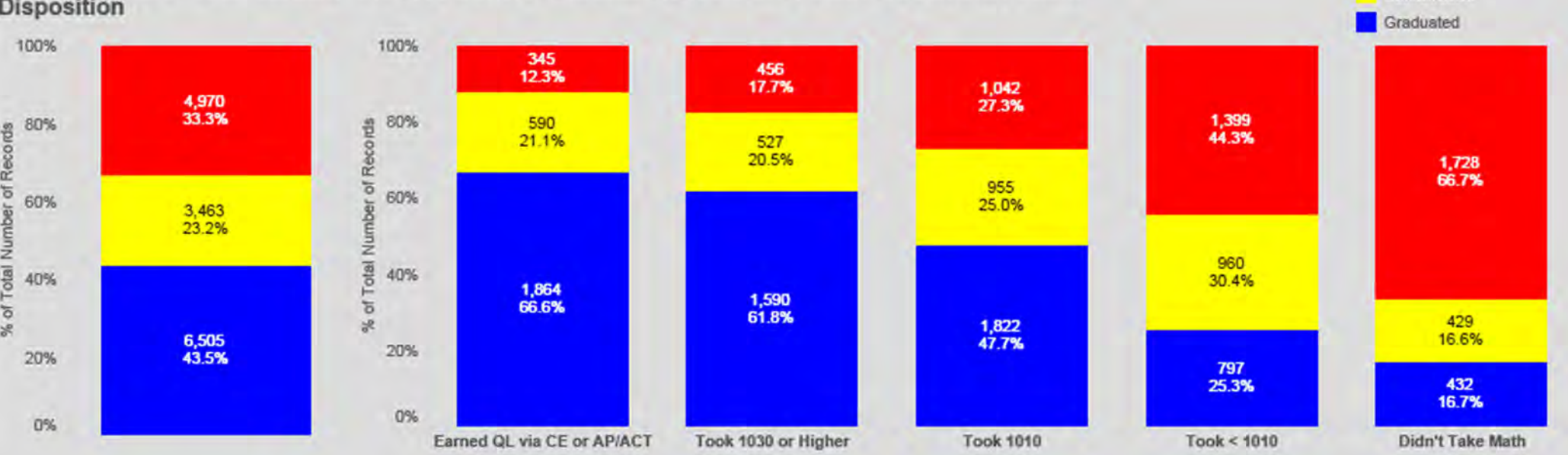


Award Type
■ Bachelor's or Higher
■ Associate's and Cont.
■ Associate's
■ Certificate

What Adds Up?

Additional Still Enrolled Information

FH 2008 Cohort - Total Student Disposition FH 2008 Cohort - Student Disposition by Math Enrollment Pattern



FH 2008 Cohort - Institution Stories - Student Outcomes by Math Enrollment Pattern

Math Enrollment Pattern	UNIVERSITY OF UTAH			UTAH STATE UNIVERSITY			WEBER STATE UNIVERSITY			SOUTHERN UTAH UNIVERSITY		
	Graduated	Still Enrolled	Left Higher Ed	Graduated	Still Enrolled	Left Higher Ed	Graduated	Still Enrolled	Left Higher Ed	Graduated	Still Enrolled	Left Higher Ed
Earned QL via CE or AP/ACT	11.8%	4.5%	2.1%	23.5%	9.3%	4.0%	15.8%	3.5%	3.1%	13.7%	2.9%	2.3%
Took 1030 or Higher	22.6%	8.2%	5.5%	10.6%	3.9%	3.7%	8.0%	2.9%	2.6%	18.0%	3.3%	3.6%
Took 1010	14.5%	10.1%	6.3%	10.8%	4.7%	5.2%	7.8%	4.5%	5.5%	13.7%	6.7%	6.7%
Took < 1010	0.7%	1.3%	1.1%	3.9%	3.2%	4.6%	5.8%	9.2%	15.4%	5.4%	3.7%	3.1%
Didn't Take Math	4.0%	2.1%	5.2%	2.9%	2.0%	7.7%	3.4%	2.7%	9.7%	2.1%	2.5%	12.3%

Math Enrollment Pattern	SNOW COLLEGE			DIXIE STATE COLLEGE			UTAH VALLEY UNIVERSITY			SALT LAKE COMMUNITY COLLEGE		
	Graduated	Still Enrolled	Left Higher Ed	Graduated	Still Enrolled	Left Higher Ed	Graduated	Still Enrolled	Left Higher Ed	Graduated	Still Enrolled	Left Higher Ed
Earned QL via CE or AP/ACT	13.0%	2.3%	2.0%	5.6%	1.1%	1.1%	5.6%	1.6%	1.4%	6.5%	1.7%	1.5%
Took 1030 or Higher	11.5%	1.3%	2.5%	12.0%	2.8%	2.4%	4.8%	2.8%	2.7%	2.6%	0.8%	0.9%
Took 1010	20.3%	3.4%	10.3%	20.0%	5.3%	9.2%	9.9%	7.3%	6.8%	10.5%	6.4%	9.1%
Took < 1010	5.3%	3.9%	7.8%	10.4%	4.7%	12.2%	7.0%	12.5%	15.4%	7.5%	10.2%	15.8%
Didn't Take Math	3.8%	1.9%	10.7%	1.7%	1.5%	10.0%	2.5%	4.7%	15.0%	2.6%	3.9%	20.2%

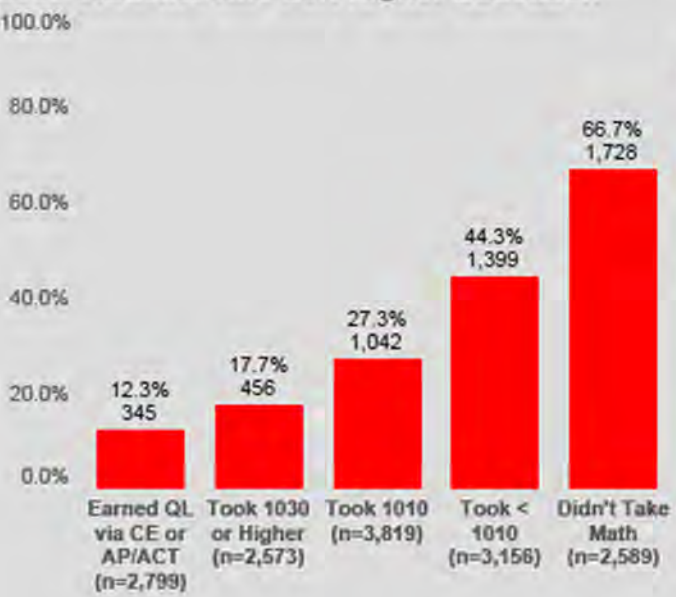
[Go to Key Findings](#)

[Go to Definitions](#)

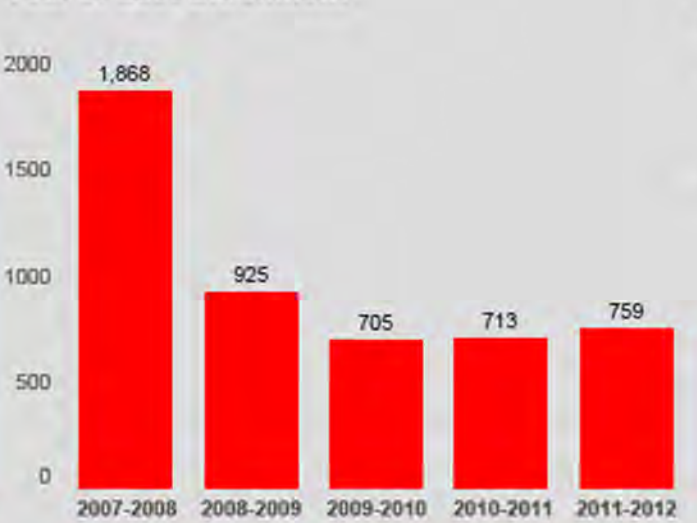
What Adds Up?

Additional Left Higher Education Information

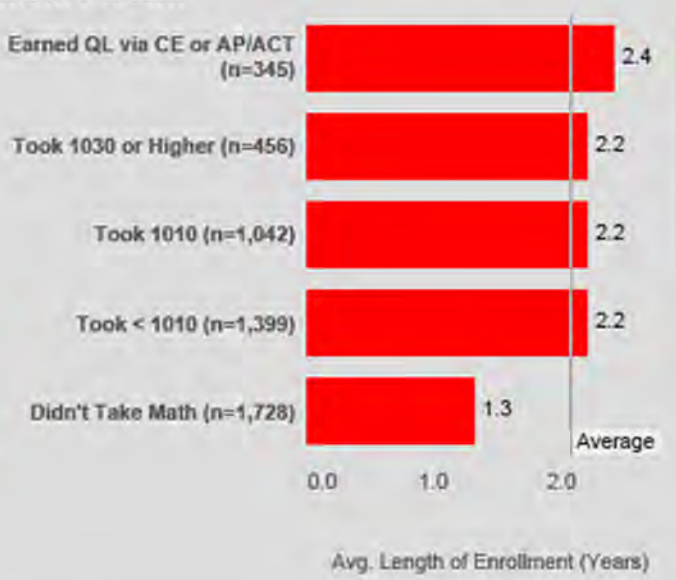
Proportion of Math Enrollment Pattern FH 2008 Students who Left Higher Education



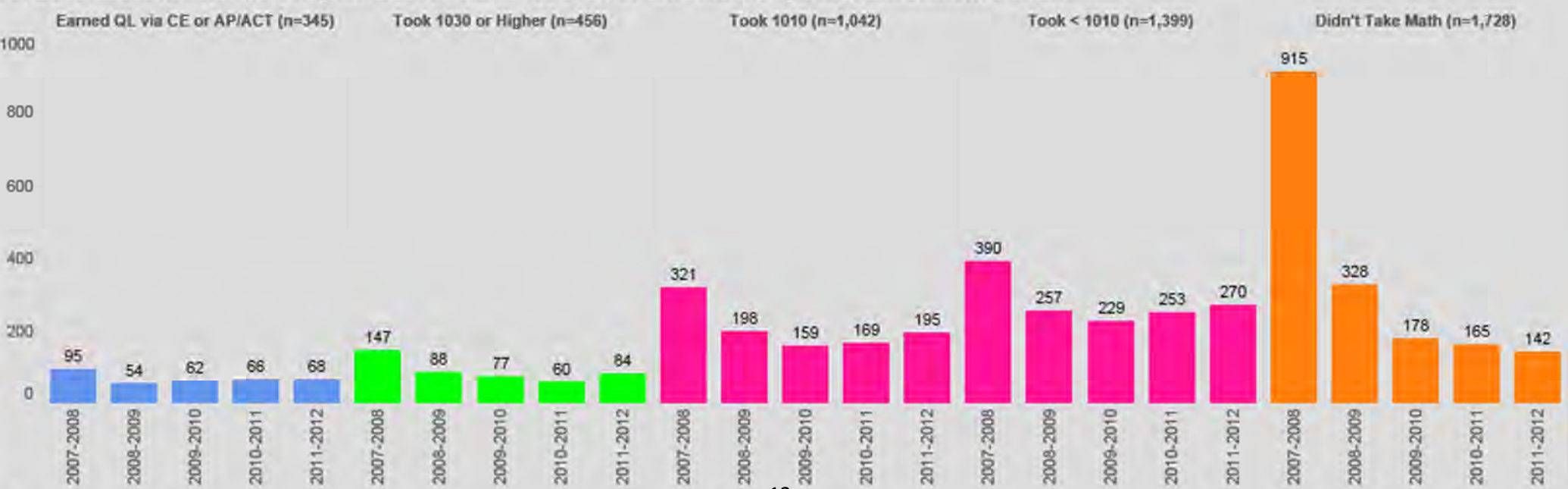
FH 2008 Students who left Higher Education by Year of Last Enrollment



FH 2008 Students who left Higher Education: Average Length of Enrollment by Math Enrollment Pattern



FH 2008 Students who left Higher Education: Last Year of Enrollment by Math Enrollment Pattern



[Go to Key Findings](#)

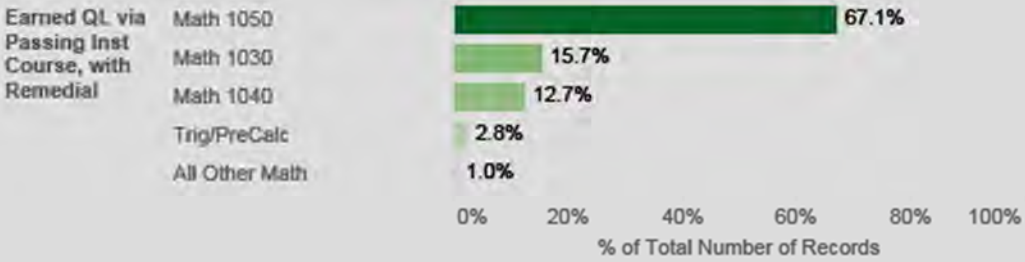
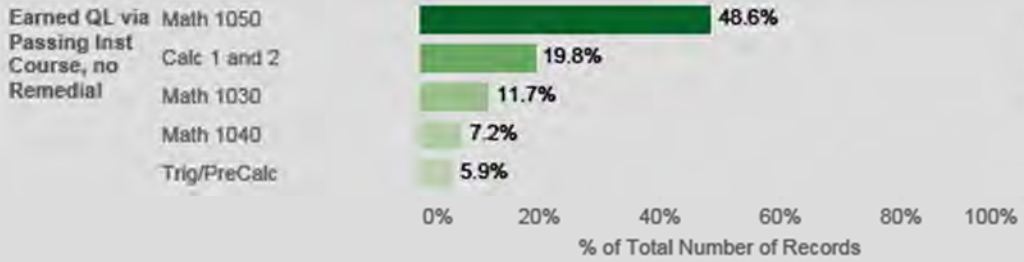
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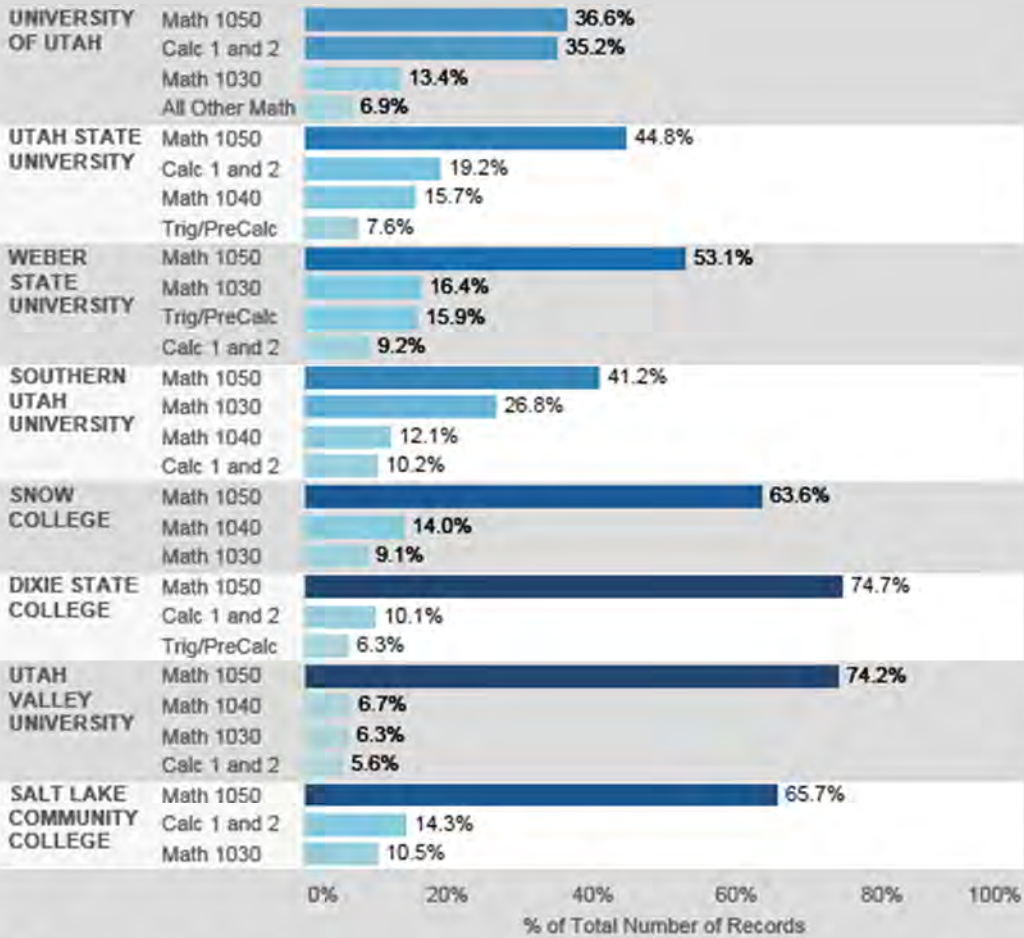
What Adds Up?

Additional Math Class Information

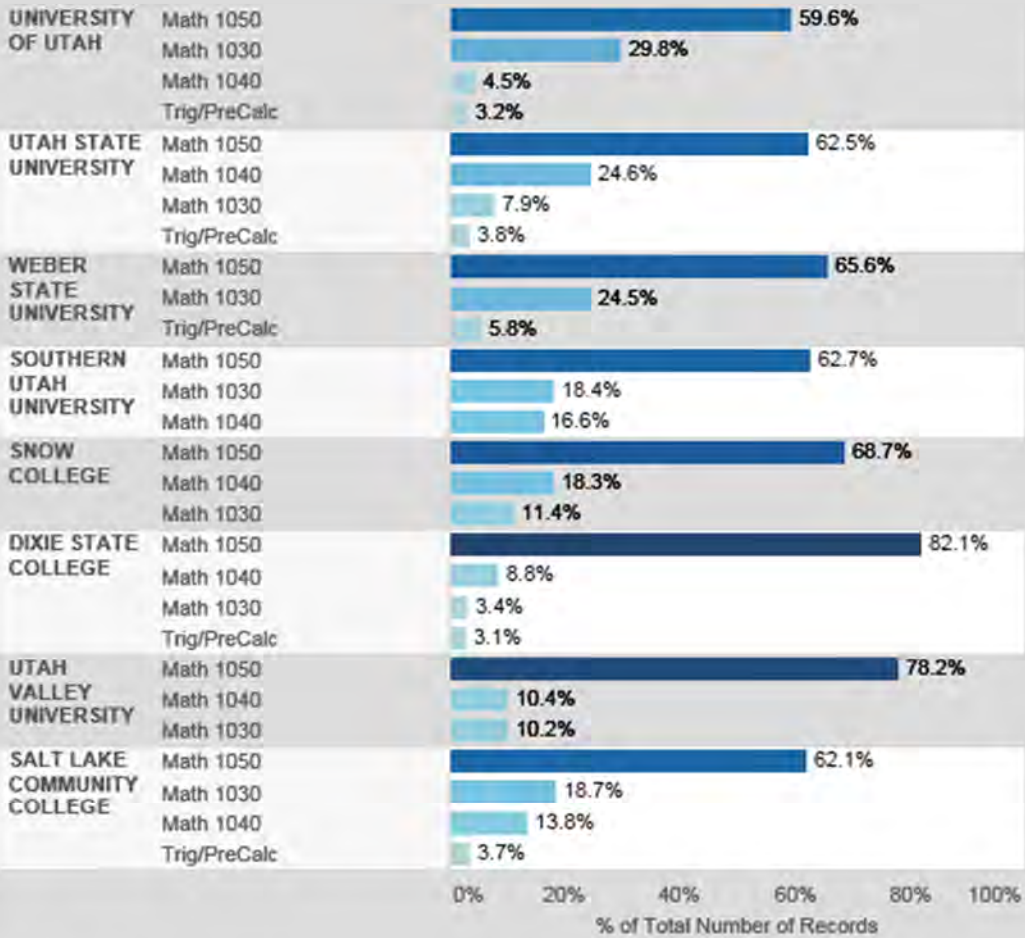
Top 5 Courses Students use to Earn Quantitative Literacy



Insitution's Top 4 QL Courses for Non-Remedial Students (class groups with n<10 have been removed)



Insitution's Top 4 QL Courses for Remedial Students (class groups with n<10 have been removed)



Definitions

Quantitative Literacy (QL) – a general education core requirement that students seeking a bachelors and most associate degrees must earn prior to receiving an award. Typically, the QL requirement is earned by passing a Math 1030/1040/1050 course (at an institution or via CE) or earning credit by AP or ACT tests scores.

FH 2008 Students – first time students who enrolled within 12 months of high school graduation during Fall 2007-Spring 2008 at one of the eight USHE institutions. This would include students who subsequently enrolled at more than one USHE institution.

Utah Data Alliance (UDA) – a partnership between six Utah agencies (Utah State Office of Education, Utah System of Higher Education, Utah College of Applied Technology, Utah Department of Workforce Services, Utah Education Network, and Utah Education Policy Center) who provide data to a statewide longitudinal database linking K-12 education, postsecondary education, and workforce data.

Earned QL Credit via CE or AP/ACT – indicates students who enrolled with QL credit already earned by passing a concurrent enrollment math course in high school, passing an AP Math exam, or are USU students who earned a Math ACT score of 26 or higher. This analysis aligns with previously prepared work.

Took Math 1030 or Higher – indicates students who passed a QL qualified course without needing to take Math 1010 or a lower math course first. For the purpose of this analysis, a student is considered to have passed a course when they earn a

C- or higher. This keeps this analysis in alignment with previously work.

Took Math 1010 or Lower – indicates students who took Math 1010 or a lower math course prior to taking a Math 1030/1040/1050 course. These students would traditionally be considered in the remedial or developmental track.

Took Math 1010 – indicates students who took Math 1010 prior to taking a Math 1030/1040/1050 course. These students did not take a lower math course and would traditionally be considered in the remedial or developmental math track.

Lower than Math 1010 – indicates students who took a math course lower than Math 1010 (950,990, etc.). Once students pass one or more of the necessary courses, they may take Math 1010. These students would traditionally be considered in the remedial or developmental track.

Never Took Math – indicates students who appear in our system as not having taken any math courses at a USHE institution. This category does includes a small number of students who took a Math 1030/1040/1050 course, failed, and then never enrolled in a Math 1010 or lower course. These students have not earned their QL credit.

Received an Award – a student disposition that includes any student who has received a degree or certificate from a higher education institution. This does include non-USHE higher education graduations for students who have such entries available in the Utah Data Alliance (UDA). UDA has entries for non-USHE awards for students who once enrolled in the Utah public K-12 education system.

Still Enrolled – a student disposition indicating that six years after initial enrollment the student is still enrolled in one of the eight public higher education institutions in Utah and has not been included in the “Received an Award” category. To be considered still enrolled a student must have enrolled in a USHE institution in either the Fall 2012 or Spring 2013 term.

Left Higher Education – a student disposition that indicates that the student left the public higher education system in Utah prior to receiving an award. To be considered having left, a student must not have been enrolled in either the Fall 2012 or Spring 2013 term and must not have been in the “Received an Award” category.

End Notes

1. “Memoranda: Institution Completion Goals.”
Memoranda: Institution Completion Goals. Utah System of Higher Education, 20115. Web. 23 Mar. 2015.
<<http://higheredutah.org/pdf/agendas/201501/TABEv3.pdf>>.
2. "Remediation: Higher Education’s Bridge to Nowhere." Remediation: Higher Education’s Bridge to Nowhere. Complete College America, 2012. Web. 23 Mar. 2015. .
3. "The Game Changers: Are States Implementing the Best Reforms to Get More College Graduates?" The Game Changers: Are States Implementing the Best Reforms to Get More College Graduates? Complete

College America, 2013. Web. 23 Mar. 2015.
<<http://completecollege.org/pdfs/CCA%20Nat%20Report%20Oct18-FINAL-singles.pdf>>.

4. Kuh, George D., Jennifer A. Buckley, Jillian Kinzie, Brian K. Bridges, and John C. Hayek. "What Matters to Student Success: A Review of the Literature." National Postsecondary Education Cooperative, 1 July 2006. Web. 14 Sept. 2015.
<http://nces.ed.gov/npec/pdf/Kuh_Team_Report.pdf>.
5. Ross, T., Kena, G., Rathbun, A., KewalRamani, A., Zhang, J., Kristapovich, P., and Manning, E. (2012). *Higher Education: Gaps in Access and Persistence Study* (NCES 2012-046). U.S. Department of Education, National Center for Education Statistics. Washington, DC: Government Printing Office.
6. A limited number of FH 2008 students earned an academic award even though they never were not included an earned QL credit group. Considering that these outliers (in total) amounted to less than 5% of the cohort and are distributed across the various student groupings, it is unlikely that these records would meaningfully affect this analysis. There are a number of reasons this might occur, including: the student could have earned QL credit through a test score after enrolling as a first time student; the student earned a degree that required Math 1010 instead of Math 1030/1040/1050 course, the student’s program accepted a non-Math department course to meet the QL, student passed Math 1030/1040/1050 with something less than

a C-, and student earned QL credit at a non-USHE institution and transferred the credit.

7. The courses listed here represent the various courses available for students from the 2008-2012 cohorts. Current Common Core high school requirements (Math 1, 2, 3) cover the same concepts in “Algebra 2” and “Lower Math”, as well as some concepts included in Pre-Calculus course curriculum.
8. Millner, Ann, and Francis Gibson. "Math Competency Initiative." *MATH COMPETENCY INITIATIVE*. Utah State Legislature. Web. 17 Sept. 2015. <<http://le.utah.gov/~2015/bills/static/SB0196.html>>.

Data for this research was accessible through Utah’s state longitudinal data system database administered by the Utah Data Alliance (UDA) which includes data supplied by UDA partners and the StudentTracker service from the National Student Clearinghouse. This research including the methods, results, and conclusions neither necessarily reflect the views nor are endorsed by the UDA partners. All errors are the responsibility of the author. For more information please visit www.UtahDataAlliance.org.