Increasing Equity and Access to AP® and Dual Credit Math Courses in Rural Schools

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Review of the Literature

Carsey Institute Brief

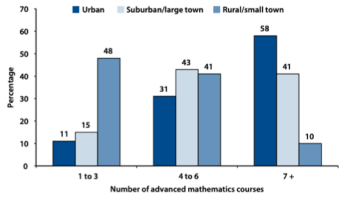
Students in Rural Schools Have Limited Access to Advanced Mathematics Courses

Author: Suzanne E. Graham

- Students living in rural areas and small towns have less access to higher-level math courses than students in suburban and urban areas.
- One in five public school students nationwide attend rural schools.
- Almost 50% of students in rural areas and small towns attend schools with only one to three advanced math courses (courses beyond Algebra I, Geometry, and Algebra II).

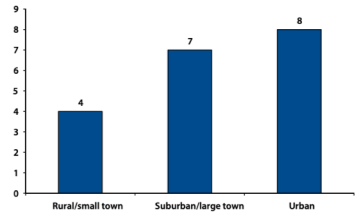
https://files.eric.ed.gov/fulltext/ED532960.pdf

FIGURE 1. PERCENTAGE OF STUDENTS IN SCHOOLS OFFERING ADVANCED MATHEMATICS COURSES, BY NUMBER OF COURSES OFFERED AND LOCATION



Source: The Condition of Education, 2005. Data drawn from the National Assessment of Education Progress (NAEP) and the High School Transcript Study (HSTS). https://files.eric.ed.gov/fulltext/ED532960.pdf

FIGURE 2. AVERAGE NUMBER OF ADVANCED MATHEMATICS COURSES OFFERED, BY LOCATION



Source: The Condition of Education, 2005. Data used includes National Assessment of Education Progress (NAEP) and the High School Transcript Study (HSTS)

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Mathematics Course-Taking in Rural Schools

Authors: Rick Anderson and Beng Chang

- Compared to students in urban fringe and central city areas, rural students are more likely to:
  - Begin high school in a lower level mathematics course
  - Take their last mathematics course earlier
  - Conclude their high school math education in a lower course
  - Have no access to AP Calculus or AP Statistics

http://irre.vmhost.psu.edu/wp-content/uploads/2014/02/26-1.pdf

Mathematics Course-Taking in Rural Schools

Authors: Rick Anderson and Beng Chang

Table 2

Percentage of Students by Number of Mathematics Credits and Location

	Number of Credits Required			Number of Credits Earned			
Location	≤2.0	2.1-3.0	≥3.1	≤3.0	3.1-3.5	3.6-4.0	≥4.1
Rural	28 (3.1)	53‡ (4.7)	19† (3.7)	35* (1.6)	8 (1.0)	34 (1.6)	23 (1.7)
Urban Fringe	22† (3.1)	67 (3.8)	11 (2.2)	29 (1.1)	8 (0.8)	37 (1.6)	26 (1.06)
Central City	33 (4.5)	58 (5.2)	9 (2.3)	29 (1.8)	9 (0.9)	36 (1.8)	26 (2.1)

Note. The standard errors of the statistics appear in parentheses. Percentages omit missing data.
*Significantly different from other locations at $p < 0.05$.
†Significantly different from Central City at $p < 0.05$.
‡Signficantly different from Urban Fringe at $p < 0.05$.

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Mathematics Course-Taking in Rural Schools

Authors: Rick Anderson and Beng Chang

Percent of Students with ACCESS to Particular Courses

Table 6

Percentage of Students by Mathematics Course Taught and Location

Location	Pre-Calculus or 3rd Year Algebra	Other Calculus	AP Calculus AB	AP Calculus BC	AP Statistics
Rural	92 (2.3)	51 (4.7)	58* (3.8)	17* (3.1)	17* (3.7)
Urban Fringe	97 (1.2)	59 (4.3)	84 (3.1)	43 (3.7)	43 (4.0)
Central City	96 (1.2)	52 (4.7)	84 (3.1)	44 (4.9)	44 (4.5)

Note. The standard errors of the statistics appear in parentheses.

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Limited Access to AP Courses for Students in Smaller and More Isolated Rural School Districts

Authors: Douglas Gagnon and Marybeth Mattingly

Key Findings

- Least likely to offer AP: Small, rural, high-poverty districts
- More affluent districts have higher success rates, regardless of location type
- Remote rural districts are 10 times less likely to offer AP than rural districts close to urban areas
- Percent of districts with students enrolled in AP courses
  - Urban – 97.4% Suburban – 94.6%
  - Town – 79.9% Rural – 52.8%

https://scholars.unh.edu/cgi/viewcontent.cgi?article=1234&context=carsey

TABLE 1. ACCESS TO AP COURSES IN RURAL DISTRICTS, BY REMOTENESS AND SECONDARY STUDENT POPULATION

	FRINGE*		DISTANT		REMOTE	
	LARGER POPULATION	SMALLER POPULATION	LARGER POPULATION	SMALLER POPULATION	LARGER POPULATION	SMALLER POPULATION
AVERAGE STUDENT POPULATION	1556	276	985	192	715	123
NUMBER OF DISTRICTS	888	503	548	2160	106	1018
PERCENT OF DISTRICTS WITHOUT AP ACCESS	7.9	37.6	16.2	57.0	33.0	69.7

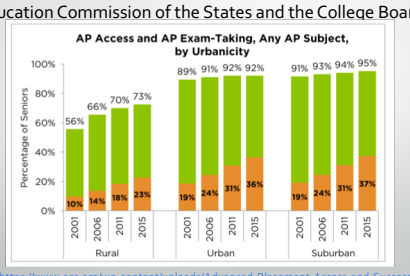
Note: *Rural fringe districts are closest to urbanized areas, whereas remote rural districts are located farthest away.

Sources: 2011–2012 Civil Rights Data Collection, 2012 Small Area Income and Poverty Estimates, and 2010 Decennial U.S. Census

https://scholars.unh.edu/cgi/viewcontent.cgi?article=1234&context=carsey

Advanced Placement Access and Success: How Do Rural Schools Stack Up?

Education Commission of the States and the College Board



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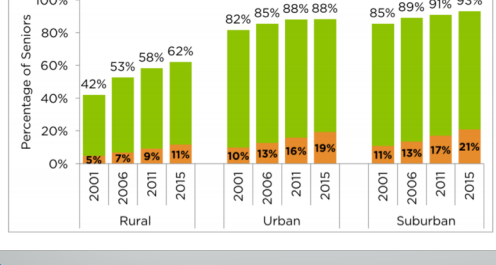

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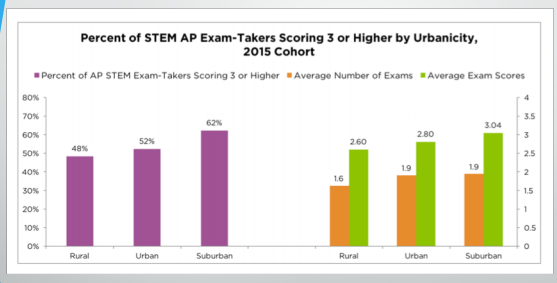

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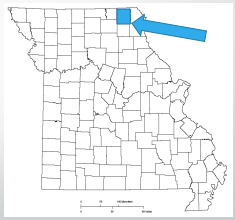
Scotland County R-1

Scotland County R-1 Demographics

- Located in Northeast Missouri
- Approximately 4,900 residents in the entire county
- Only school district in the county
- Approximately 630 students pre-k through 12th grade
- Around 160 students in grades 9 - 12
- 52.4% of students qualify for free or reduced lunch
- Graduating class size: 30-45 students



Math Course Offerings Prior to 2013

- Mainly Algebra I, Geometry, Algebra II, Precalculus of some kind
- Occasionally offered dual credit College Algebra when a qualified teacher was on staff
- Some students took College Algebra online or via ITV (Interactive Television)
- Occasionally offered a Math Applications or Business Math course
- No Advanced Placement courses were offered
- Algebra I taken in 8th grade counted as one of the three required high school math credits

Observations & Challenges at SCR-1

- Only 2 math teachers for grades 9-12
- Many students cannot afford the costs of dual credit courses and AP exams
- Options for senior year depended on whether or not a student could afford dual credit courses
- Students taking online dual credit courses often used their own laptops and had internet access at home
- Students seemed to avoid online dual credit math courses
- Results of math placement test in 6th grade often set students on a particular pathway with few options

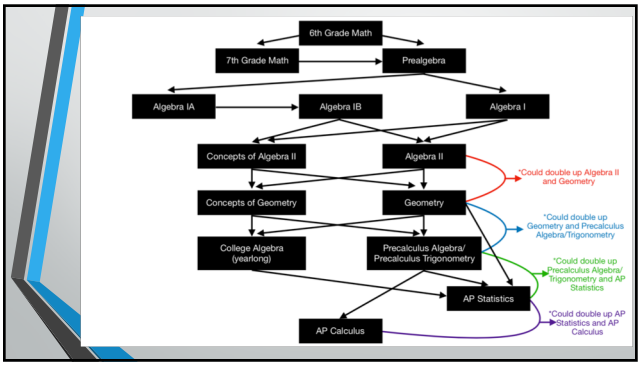
Strategies to Increase Equity and Access to AP and Dual Credit Math Courses

- New course offerings with flexibility and revamped curriculum
- Advanced Placement Program
- Learning lab for students taking online dual credit courses
- Annual AP and Dual Credit Informational Meeting
- Dual credit scholarships
- Fundraising to pay for AP exams
- Conferencing with students annually about math course options

Current Math Course Offerings

- Algebra IA
- Algebra IB
- Algebra I
- Concepts of Geometry
- Geometry
- Concepts of Algebra II
- Algebra II
- College Algebra (yearlong, dual credit)
- Precalculus Algebra (semester, dual credit)
- Precalculus Trigonometry (semester, dual credit)
- AP Statistics (dual credit)
- AP Calculus (dual credit)

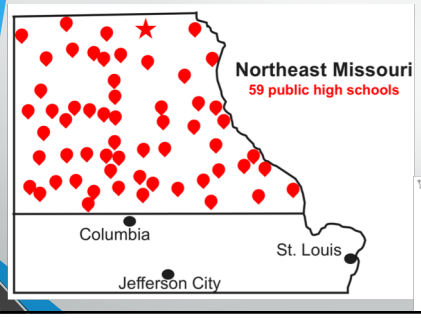
Students are now required to take 3 math credits during grades 9-12



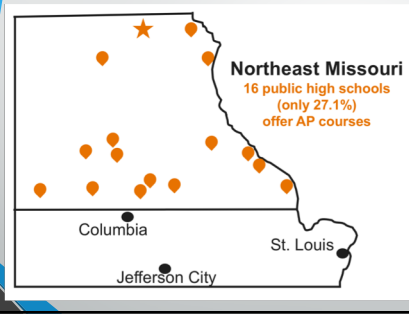
Advanced Placement Program at SCR-1

	2014-15	2015-16	2016-17	2017-18	2018-19
Calculus AB	★	★	★	★	★
Chemistry		★	★	★	★
English Language and Composition					★
Physics 1	★	★	★	★	★
Statistics		★	★	★	★
US Government and Politics					★
US History		★	★	★	★

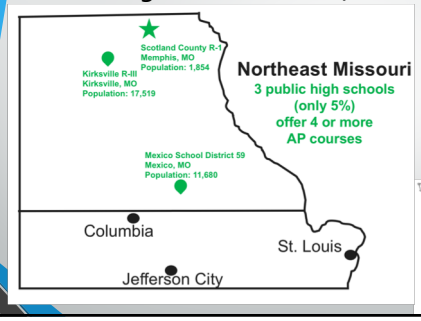
Public High Schools in Northeast Missouri



Public High Schools Offering AP Courses



Public High Schools with 4+ AP Courses



Learning Lab

- Computer lab supervised by a certified teacher
- Utilized for students taking foreign language courses through Rosetta Stone and students taking online dual credit courses
- Implemented for the 2015-16 academic year
- As a result, ITV classroom was removed for the 2017-18 academic year
- Gives ALL students computer/internet access to take an online dual credit course and time to complete assignments

AP and Dual Credit Informational Meeting

- First implemented in 2014-15 academic year
- Developed to make sure ALL students learn about dual credit and AP opportunities
- Held annually in March or April
- Parents and students in grades 9 – 11 invited to learn about dual credit and AP options
- Presentation about math dual credit and AP options taught onsite and about online dual credit options through three different colleges/universities

Dual Credit Scholarships

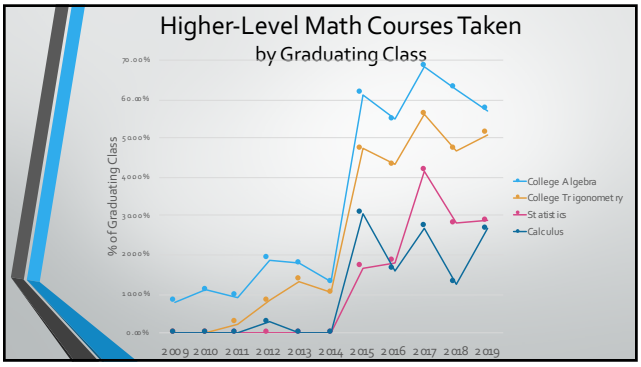
- Need-based scholarships
  - Approached businesses and organizations offering scholarships for graduating seniors
  - Approached some individuals who donate to the school regularly
  - Worked with the SCR-1 School Foundation
- General scholarships
  - School Foundation: donations designated for dual credit scholarships can be made with or without restrictions
  - After Prom: offered as prizes
- Supportive Community Members
  - Help pay dual credit fees for students with special circumstances

Covering the Costs of the AP Exams

- **Goal to cover the cost of every AP exam**
  - Donations
  - Fundraising: engaging students, parents, and the community
    - Set up and work the concession stand at sporting events
    - Bandanas and tutus for Homecoming and Courtwarming
    - Booth at craft fair
    - Raffle
    - Meal before athletic events
    - Car wash
    - Tip night

Conferencing with Students

- Math teachers meet one-on-one with each student each year in the spring
- Discuss each student's goals and post-secondary plans
- Discuss options for math courses the next academic year
- Discuss whether or not the student would need to double up in order to get to certain math courses
- Teacher provides recommendations to each student and to the guidance counselor
- Certain dual credit courses require a qualifying placement score (ACT or Accuplacer)
- Guidance counselor also discusses course scheduling with each student
- Student and parent(s) make final decision



Questions?

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