NCSSS INSIGHT SURVEY 2023

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ARKANSAS SCHOOL FOR MATH, SCIENCES, + THE ARTS

- The first Insight survey was last year, in 2022 - largely demographics of schools, differentiating factors of NCSSS schools, and important topics.

- This second survey, from 2023 expands upon the first and digs deeper into particular questions.

Consider Populations 2022 vs 2023

Oct 9-Dec 11 Survey Run Dates	42 Responses	34 Repeats from the 52 in 2022	8 New Respondents

Classification
Fewer:
Half-Day Programs
Program w/in School
Residential Schools

Grades/Size
Fewer 2-year and 4-year schools (although 4-year still most prevalent)
Loss of largest (1500+) and smallest (1-100) schools

Type
Largely schools:
Serving all genders
Public
State/District Funded

- Differences between the respondents in the 2022 and 2023 surveys.

- 42 instead of 52; 34 which are repeats from 2022 (referred to as replicates) and 8 are new.

- Broad changes in respondents categories by classification of school, grade/class size, and type of STEM school.

Geographical representation

In 2023, greater representation from the South and decreased from Middle Atlantic.

Midwest: Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Nebraska, North Dakota, Ohio, South Dakota, Wisconsin

Middle Atlantic: Delaware, District of Columbia, Maryland, New Jersey, New York, Pennsylvania

South: Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, Missouri, North Carolina, South Carolina, Tennessee, Virginia, West Virginia

Southwest: Arizona, New Mexico, Oklahoma, Texas

New England: Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, Vermont

West: Alaska, California, Colorado, Hawaii, Idaho, Montana, Nevada, Oregon, Utah, Washington, Wyoming
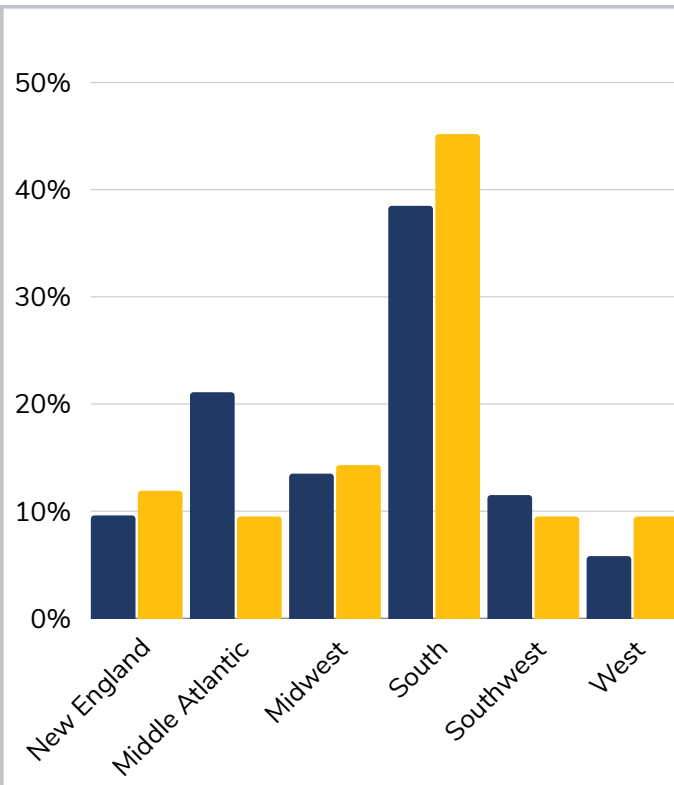
- Changes in geographical representation between 2022 respondents and 2023 respondents.

- Numbers in parentheses throughout indicate sample size (# of respondents for that question).
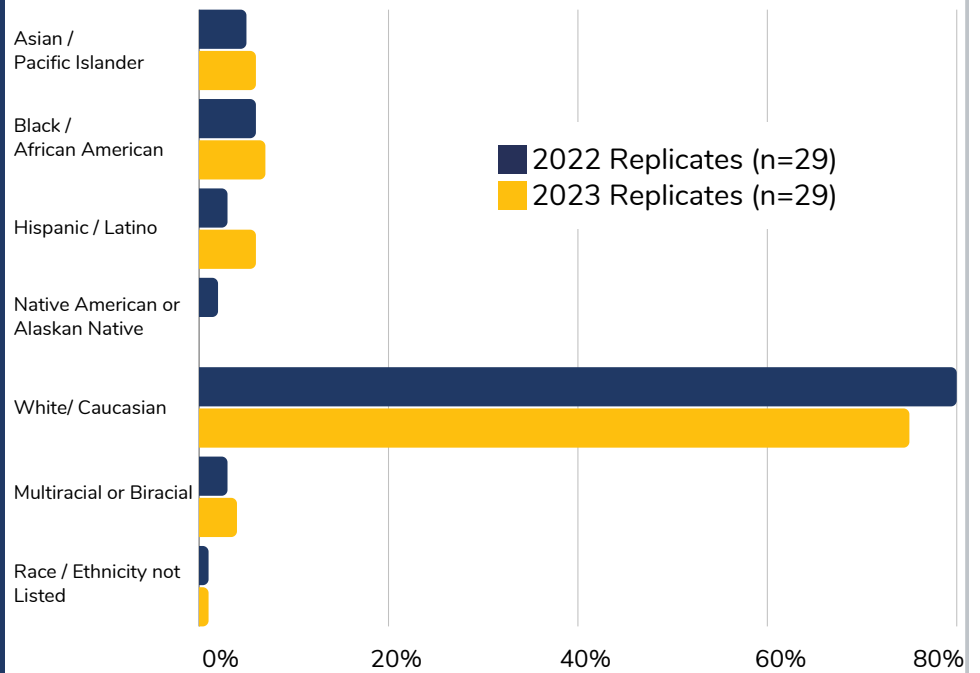
Faculty Composition
2022 vs 2023

Little variation between years. whether comparing all respondents or only the replicates.

2022 to 2023 Replicates:
- Hispanic/Latino ⬆ by 3%
- N. American/Alaskan ⬇ by 2%
- White/Caucasian ⬇ by 5%

Replicates give us the best picture of change across time since comparing all schools might capture changes based on "who" responds rather than consistent populations.

■ 2022 Replicates (n=29)
■ 2023 Replicates (n=29)

Asian / Pacific Islander

Black / African American

Hispanic / Latino

Native American or Alaskan Native

White/ Caucasian

Multiracial or Biracial

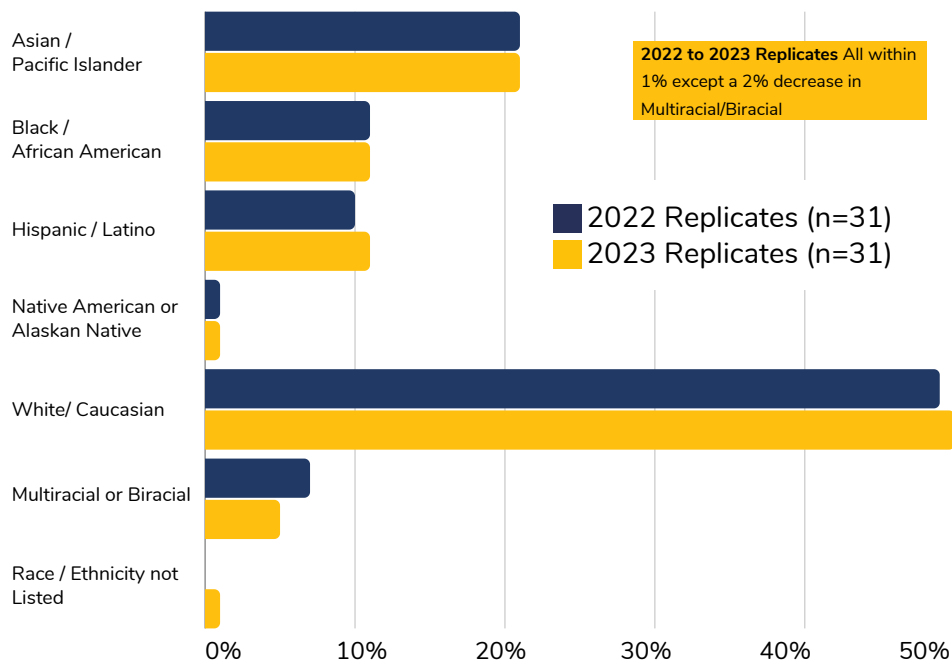Race / Ethnicity not Listed

0%   20%   40%   60%   80%

- Compares the race/ethnicity of faculty from respondents in 2022 vs 2023 to determine if there are significant changes year-to-year.

- No significant changes comparing all respondents (data not shown) or just the replicates (those that responded in both 2022 and 2023).

Student Composition 2022 vs 2023

Again, replicates give us the best picture of change across time since comparing all schools might capture changes based on "who" responds rather than consistent populations.

There are no significant differences between the replicates. Student composition doesn't seem to shift significantly in one year.

2022 to 2023 Replicates All within 1% except a 2% decrease in Multiracial/Biracial

Legend:
- 2022 Replicates (n=31)
- 2023 Replicates (n=31)

Chart categories (y-axis):
- Asian / Pacific Islander
- Black / African American
- Hispanic / Latino
- Native American or Alaskan Native
- White/ Caucasian
- Multiracial or Biracial
- Race / Ethnicity not Listed

X-axis: 0%, 10%, 20%, 30%, 40%, 50%

- Compares the race/ethnicity of students from respondents in 2022 vs 2023 to determine if there are significant changes year-to-year.

- No significant changes comparing all respondents (data not shown) or just the replicates (those that responded in both 2022 and 2023).
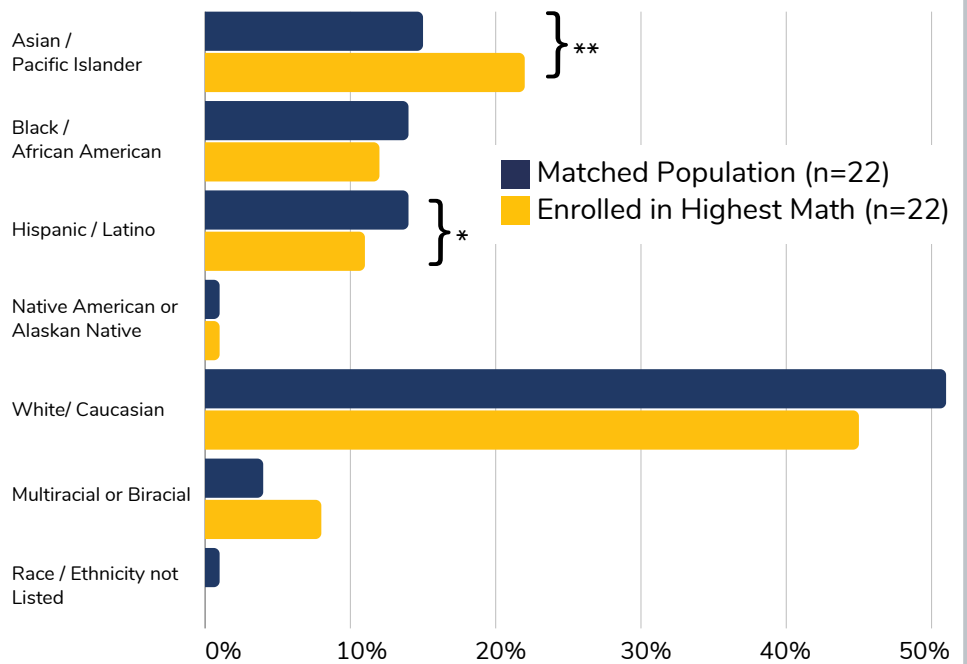
Representation in STEM Classes

Classes
Enrollment in the Highest Math
by Race/Ethnicity

"Matched" is the average student population specifically in the schools that reported on students taking the highest math.

Asian/Pacific Islanders higher**

Hispanic/Latinos lower*

Chart legend:
- Matched Population (n=22)
- Enrolled in Highest Math (n=22)

Categories (top to bottom): Asian / Pacific Islander **, Black / African American, Hispanic / Latino *, Native American or Alaskan Native, White/ Caucasian, Multiracial or Biracial, Race / Ethnicity not Listed

X-axis: 0%, 10%, 20%, 30%, 40%, 50%

- In the 2022 survey, respondents were asked what the highest level math class their school offered.

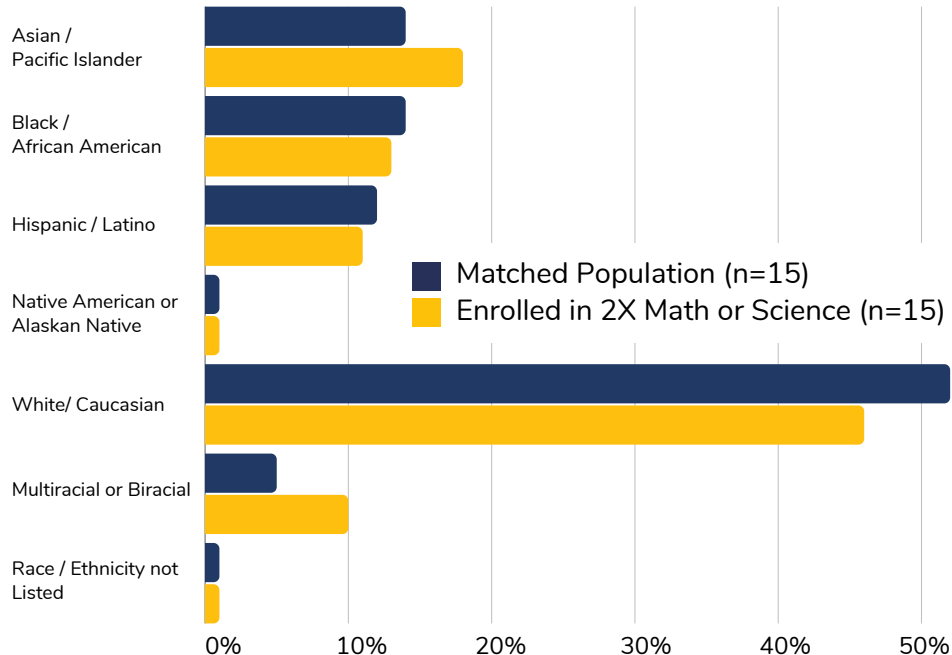- To follow up, the 2023 asked who was actually enrolled in that highest math class (no matter what it is).

- Comparisons are between the students enrolled in the highest math class and populations of the schools that reported those numbers (n=22).

Classes
Enrollment in 2X Math/Science
by Race/Ethnicity

"Matched" is the average student population specifically in the schools that reported on students taking 2 math or 2 science classes.

There were no populations of students taking 2X Math or Science that significantly differed from the average school population.


Chart legend:
- Matched Population (n=15)
- Enrolled in 2X Math or Science (n=15)

Categories (top to bottom): Asian / Pacific Islander, Black / African American, Hispanic / Latino, Native American or Alaskan Native, White/ Caucasian, Multiracial or Biracial, Race / Ethnicity not Listed

X-axis: 0% 10% 20% 30% 40% 50%

- Comparisons are between the students enrolled in 2x math or 2x science classes and populations of the schools that reported those numbers (n=15).

Classes
Enrollment in Highest Math & 2X Math or Science
by Gender

- There are no significant differences between males and females enrolled in these classes or compared to their matched populations in the school.

- Trends:
  - ⬇ females in highest math, ⬆ males (NS).
  - Females are more likely to take double math or science than to take the highest math class (NS).

- Significantly fewer Non-Binary students take the highest math class offered compared to the percentage in the population.

Legend:
- Highest Math Matched (n=21)
- Highest Math (n=21)
- 2X Math/Science Matched (n=15)
- 2X Math/Science (n=15)
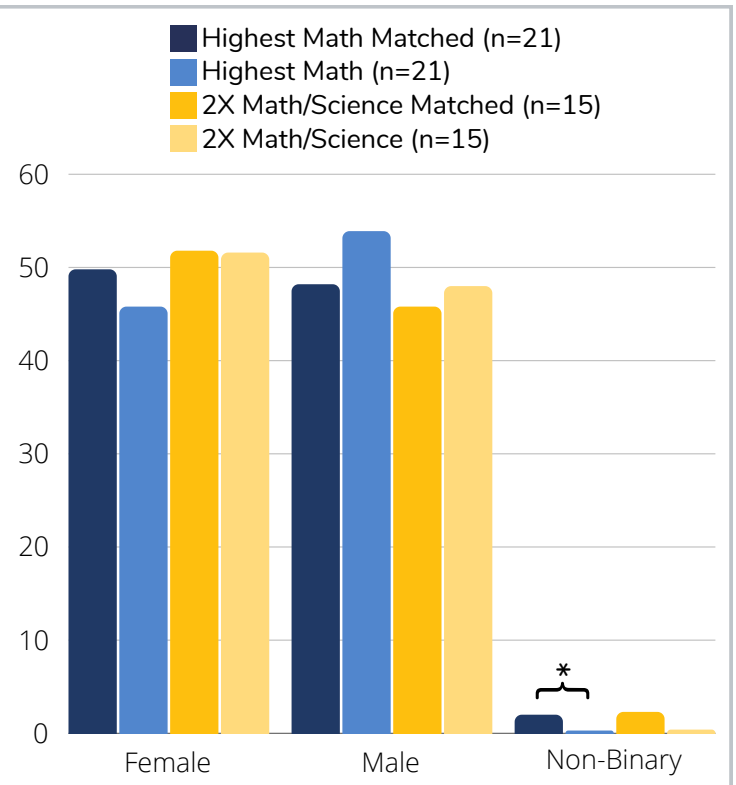
- In the 2022 Survey, percentages of males and females were assessed and were found to be equally represented in NCSSS Schools (n=49). The 2022 numbers were used as the Matched controls for this analysis.
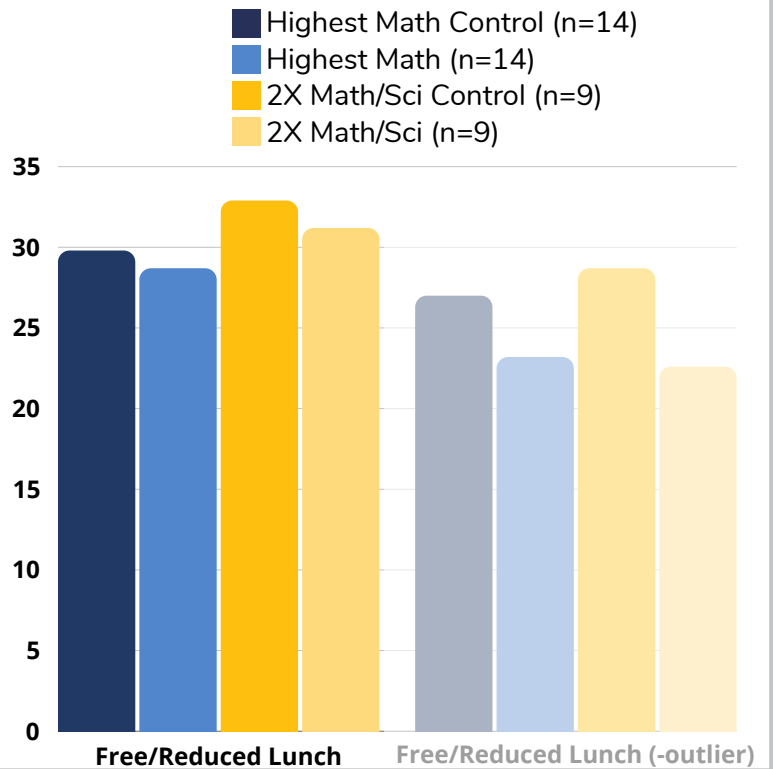
- Comparisons are between the students enrolled in the respective class(es) and populations of the schools that reported those numbers (either 21 or 15).

Classes

Enrollment in Highest Math & 2X Math or Science

by Free/Reduced Lunch

- No significant differences between low income students in the population and in classes.

- One school was an outlier in how many of their students on free and reduced lunch took these classes. In order to fairly evaluate the remaining schools, that school was removed from the analysis.

  - Differences in class representation and population increased, but still did not reach significance.

Legend:
- Highest Math Control (n=14)
- Highest Math (n=14)
- 2X Math/Sci Control (n=9)
- 2X Math/Sci (n=9)

Categories: Free/Reduced Lunch, Free/Reduced Lunch (-outlier)

- In an effort to assess the enrollment of lower income students in high achievement classes, we analyzed the enrollment of students on free or reduced lunch in these classes.

- Comparisons are between the students enrolled in the respective class(es) and populations of the schools that reported those numbers (either 14 or 9).

School Resources & Offerings

Average cost per student

Substantial variability in responses.

- Some reported what students pay and others reported what is billed to home districts; many do not track this information.

- Overall, it was clear even with this variability that residential schools have a higher cost per student, while half-day programs incur less of a cost per student.
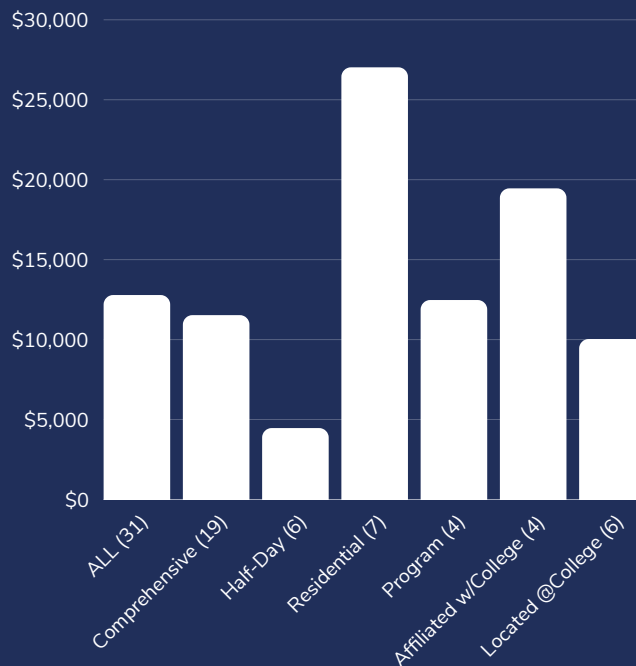
Math Electives

- Abstract Algebra (3)
- Complex Variables
- Computational Thinking
- Constructing Math
- Cryptography
- Data Analysis & Statistical Reasoning
- Machine Learning
- Math Team
- Mathematical Modeling (3)
- Mathematical Research
- Number Theory (3)
- Theory of Analysis

Science Electives

- Analytical Chemistry (2)
- Animal Behavior
- Bioethics
- Bioinformatics
- Cancer Biology
- Clinical Mycology
- Computational Drug Design
- Environmental Microbiology
- Food Science
- Forensics (4)
- Hydroponics
- Infectious Diseases
- Inventors and Innovations (1)
- Material Science
- Medical Microbiology
- Medicinal Chemistry
- Microwave Spectroscopy
- Molecular Spectroscopy
- Paradigms of Science, Society, and Literature
- Physics in the Arts
- Practicum in STEM

Engineering Electives

- App & Game Development
- Architecture
- Autonomous Cars
- Biomedical Engineering
- Civil Engineering
- Computational Thinking
- Creative Engineering and Design
- Engineering Technology
- Innovation and Design
- Inventors and Innovation
- Machine Learning (Design)
- Mechanical Engineering
- Mechatronics
- Metal Working
- Microcontroller Applications
- Physics of Engineering
- Product Design
- Prototyping
- Robotic Engineering
- Statics
- Systems Level Programming
- Woodworking

Other Electives

- Machine Learning (AI)
- Intercultural Communication
- Time Travel
- Gastronomy
- Object Oriented Programming
- Web Technologies
- Advanced Computer Science
- Artificial Intelligence
- Bioethics
- Database Design
- Ethical Leadership
- Evolution of Scientific Thought
- Game Design
- How to be an Adult
- International Economics
- Machine Learning
- Macroeconomics
- MakerSpace
- Quantitative Financial Analysis
- Quantum Computing (DE)
- Sports Medicine
- Technology Ventures

- What interesting electives are offered outside the traditional high school curriculum?

STEM areas

English Electives

- African American Literature (2)
- Austen, Bronte, and Film
- Aviation Journalism
- British Women Writers
- Broadcasting
- Eco-Fiction
- Existential Literature
- Film and Literature (2)
- Gender in Literature (2)
- Gothic Literature
- Graphic Novels: Image and Texty
- Mysteries and Monsters
- Playwriting
- Poetry/ Expression and Experiment in Poetry (3)
- Russian Literature
- Satire
- Science Fiction (2)
- Sherlock Holmes and Pop Culture
- Songwriting
- Studies of Folklore
- Writing in STEM

Art Electives

- 3D Rendering and Animation
- Architecture
- Digital Storytelling
- Experiential Arts and Architecture (Global Learning)
- Explorations in Art
- Fashion Design
- Fibers and Textiles
- Film Studies
- Graphic Design
- Humanities through the Arts
- Mathematics of the Arts
- Modern Design and Craft
- Scientific Illustration
- Sculpture I/ Sculpture II
- Video Game Design
- Weaving
- Wheel Throwing

Music Electives

- Advanced Choir
- American Popular Music
- Chamber Orchestra
- Concert Choir (2)
- Digital Music/Electronic Music (2)
- Folk Music and Acoustics
- Guitar (2)
- Guitar Building
- History of American Music
- History of Blues and Rock
- Jazz Ensemble (2)
- Mandolin Orchestra
- Mariachi
- Music and Business
- Music Appreciation
- Music Technology
- Percussion (2)
- Piano Studies (3)
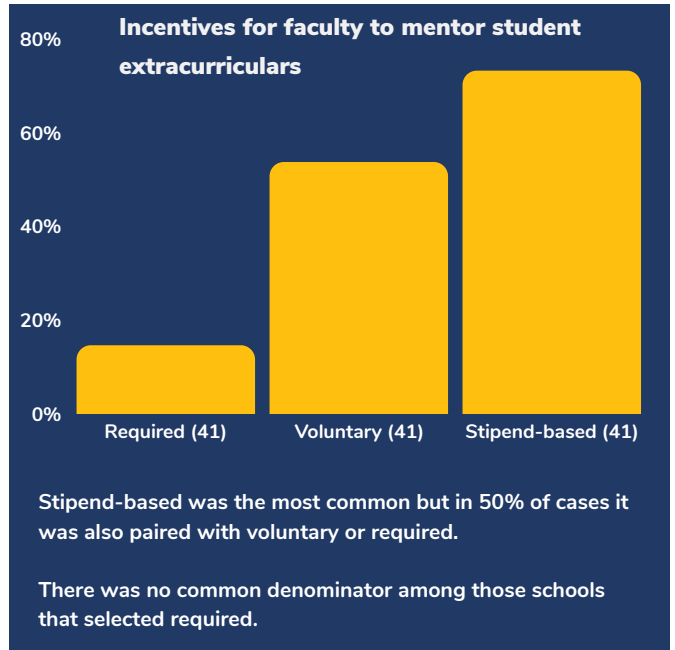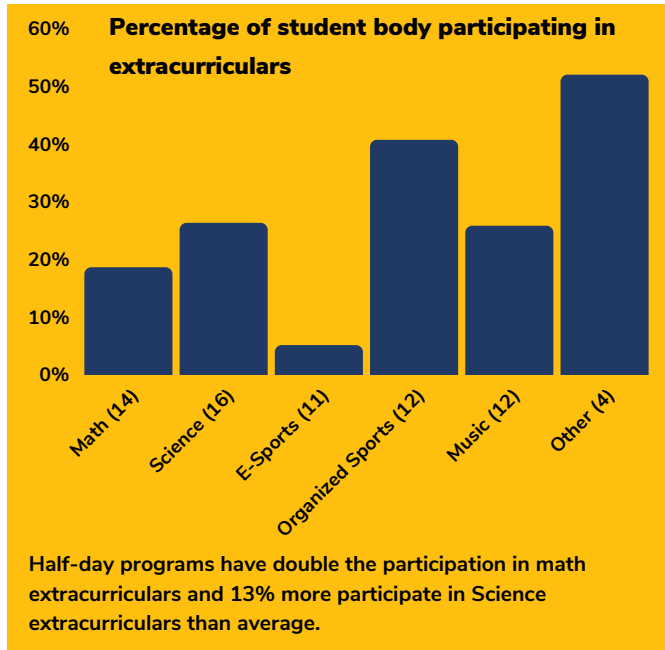- School of Rock
- Songwriting (2)
- The Beatles

History Electives

- African American History
- Asian Studies
- Disability History
- Ethnic Study: Mexican American
- History of Biology and Medicine
- History of Byzantine Empire
- History of Cryptography
- History of Engineering
- History of the Environment
- International Issues in STEM
- Jewish History
- Korea to Vietnam
- Middle Eastern Studies
- Modern Latin America
- Muslim History
- Native American Studies (2)
- Patterns of Criminal Justice
- Political Theory
- Rise of the City
- Sizzling Sixties
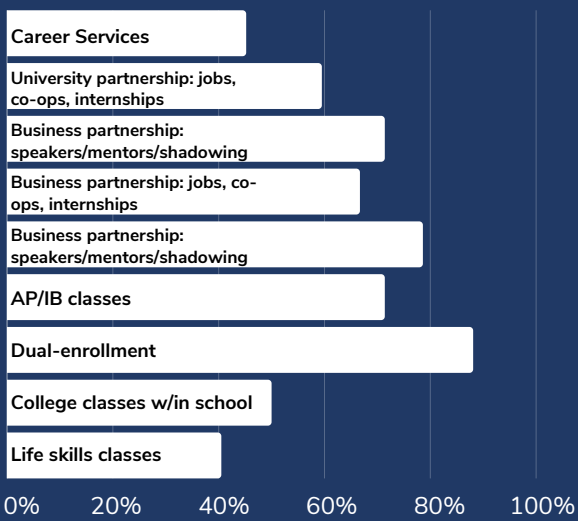- Tales from the Crypt
- The Age of FDR

- What interesting electives are offered outside the traditional high school curriculum?

Humanities

Extracurriculars: students and staff

Percentage of student body participating in extracurriculars

Half-day programs have double the participation in math extracurriculars and 13% more participate in Science extracurriculars than average.

Incentives for faculty to mentor student extracurriculars

Stipend-based was the most common but in 50% of cases it was also paired with voluntary or required.

There was no common denominator among those schools that selected required.

Resources offered to students

Career Services

University partnership: jobs, co-ops, internships

Business partnership: speakers/mentors/shadowing

Business partnership: jobs, co-ops, internships

Business partnership: speakers/mentors/shadowing

AP/IB classes

Dual-enrollment

College classes w/in school

Life skills classes

0% 20% 40% 60% 80% 100%

- Comprehensive full day schools partner with both universities and businesses 10-20% more often than average.

- Residential schools are 30% more likely to offer life skill classes than on average.

- Schools located on college campuses offer dual-enrollment or college classes 2X more than AP classes.

- 4-year and 5-8+year schools are 2X as likely to offer AP classes than 2- and 3- year schools.

- Other resources mentioned: Leadership academy, Beyond AP, Virtual high school, SEL programming, College prep time, CTE classes.

n= 42
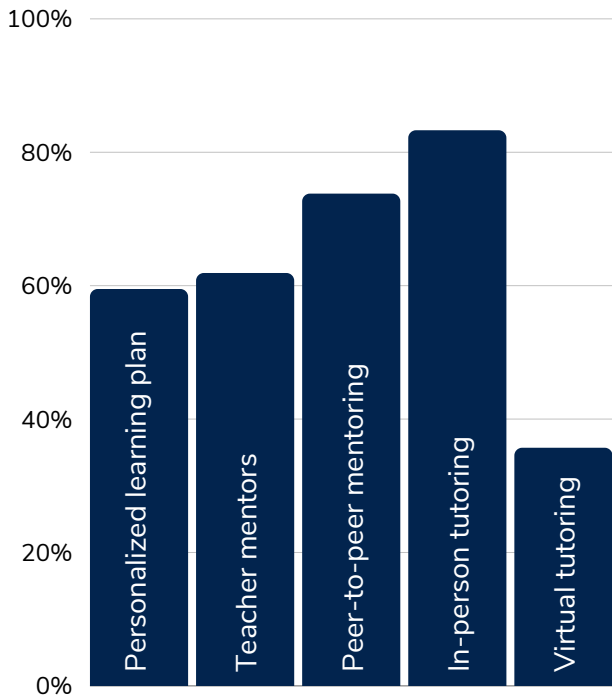
# What steps are taken to help current students succeed?

Schools selected all categories that applied

- School affiliated with colleges and on college campuses are 10-15% more likely to use peer-to-peer mentoring than average.

- Programs have a 10% higher rate than average of using a personalized learning plan.

- 100% of residential programs use in-person tutoring.

- Comprehensive full day and residential schools are more likely to use teacher mentors than half-day programs, which more often use virtual tutoring.

n= 42

Innovative curriculum

- Half-day programs are 12% more likely to use a flipped classroom than average.

- 50% of residential schools use gamification compared to the average of 21.4%.

- 2-year schools are 10% less likely to use mastery-based grades than the average.

- Schools in the South or Middle Atlantic are the most likely to use VR.
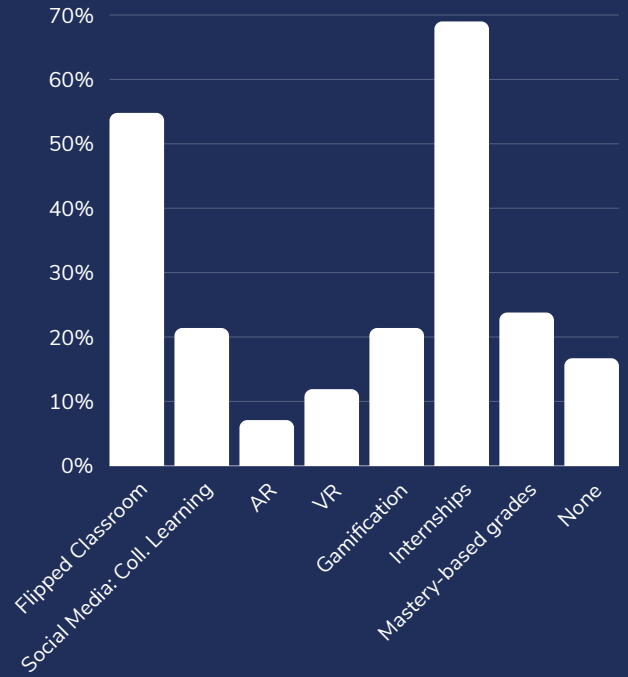
Other: Research, Service, Hybrid, and Project-based learning   n=42

Innovative facilities

**Other: Specialty science lab spaces, Collaboration space, CyberRange**

- Half-day schools are more than 10% more likely than other school classifications to have a Fab lab.
- Schools in New England and the South are at least 10% more likely than schools in other areas to have a Creative commons.
- Residential schools are the least likely school classification type to have a Fab lab, Creative commons, or Digital arts lab.

n=42
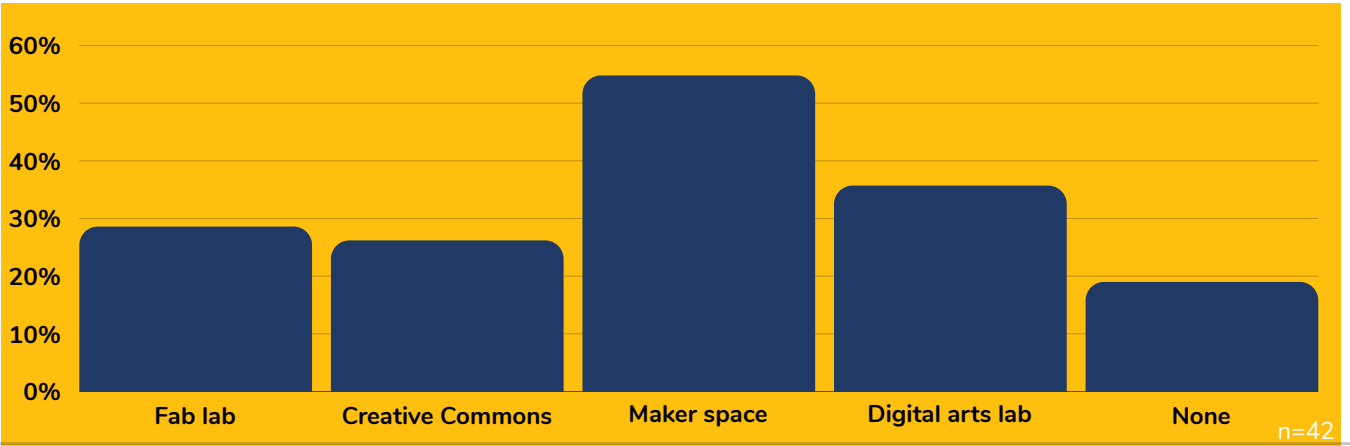
School expansion & renovations

While there are many schools not anticipating any expansions or renovations (42.9%), especially within the Affiliated and Located on Colleges Campuses categories (66.7% an 62.5%, respectively), many schools indicated at least one category of interest, with an average of about 20.8% across categories.

The yellow bars show average interest in categories across all schools and the group most exceptional to the average is in blue to demonstrate which types of schools trend toward most interest per category.

n=42
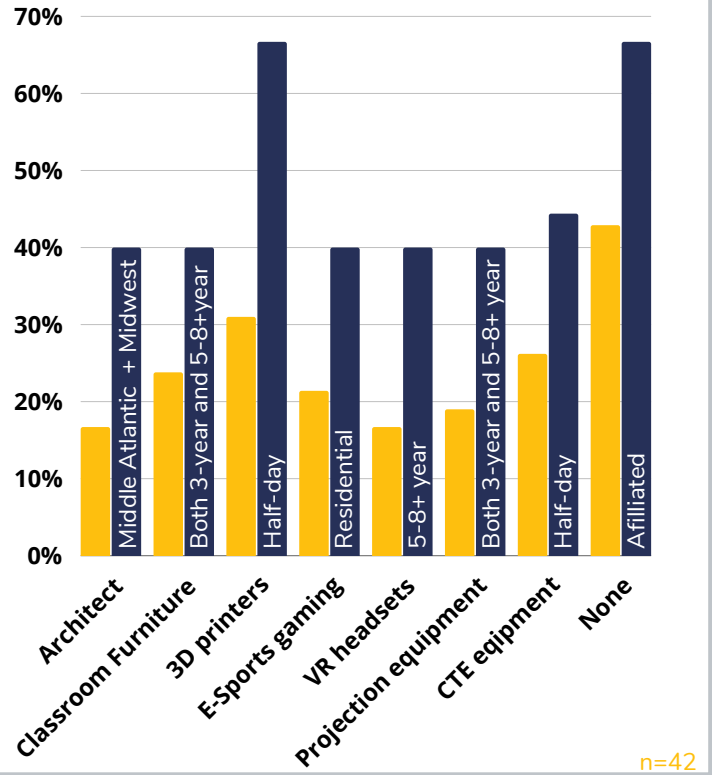
Is it important to provide Cloud Technology curriculum to students in the next 12 months? How much currently?

	0 Hours	1-10 Hours	11-20 Hours	21+ Hours	Total
Strongly Agree	0	8	3	2	13
Agree	4	10	2	1	17
Neutral	6	2	0	0	8
Disagree	1	0	0	0	1
Strongly Disagree	0	0	0	2	2
Total	11	20	5	5	41

- Respondents answered "Strongly Agree" to "Strongly Disagree" for whether it is important to provide Cloud Technology curriculum in the next 12 months.

- These answers are aligned with how much curriculum each respondent is currently offering.

- In most cases, agreement tends to correlate with some current curriculum.

Outcome

Graduates
Class of 2023

31% of respondents reported declared majors

- Science is at 34% for both groups - includes clinical majors.

- Tech & Engineering and Math would likely be significant if the trend continued with more respondents.

STEM schools seem to have increased rates of a subset of STEM majors declarations.

Legend:
- NCSSS (2023 Grads)
- National (Niche 2023)

n=13
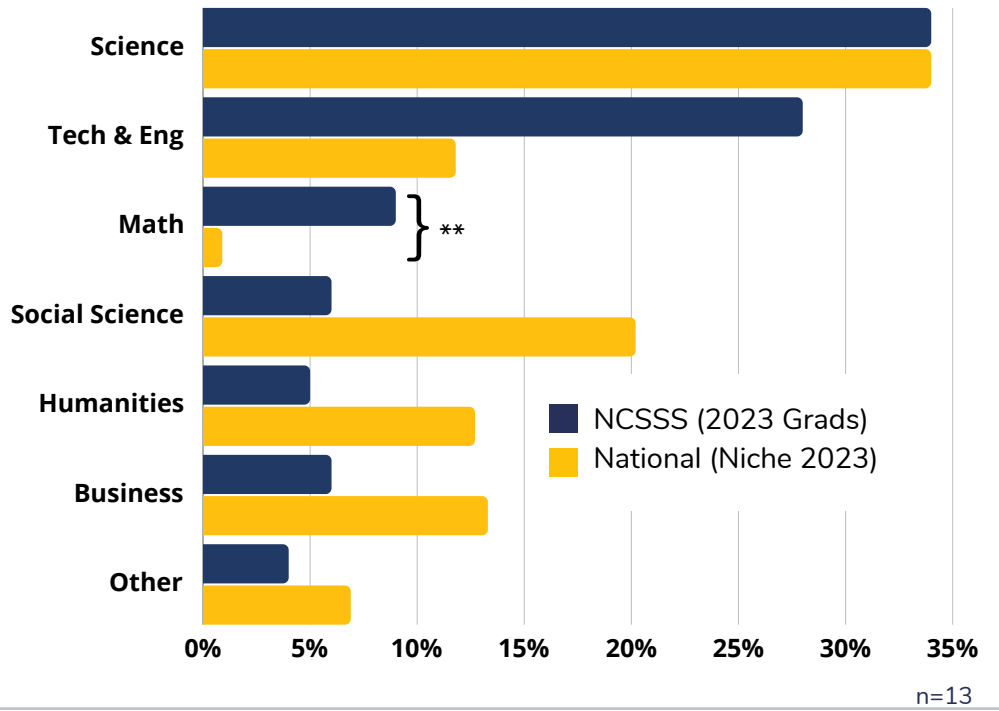
Tracking alumni outcomes: where and how

	No* (16)	Yes (8)	Yes, NSC (14)	Total (38)
College/University	88%	98%	98%	94%
Community College	7%	1%	0%	3%
Technical School/Employment	1%	0%	0%	0%
Military/Gap	1%	1%	0%	1%
Unknown	1%	0%	0%	1%

Those who do not use the National Student Clearing House track by: staff, student self-report, in-house, foundation, alumni, and survey
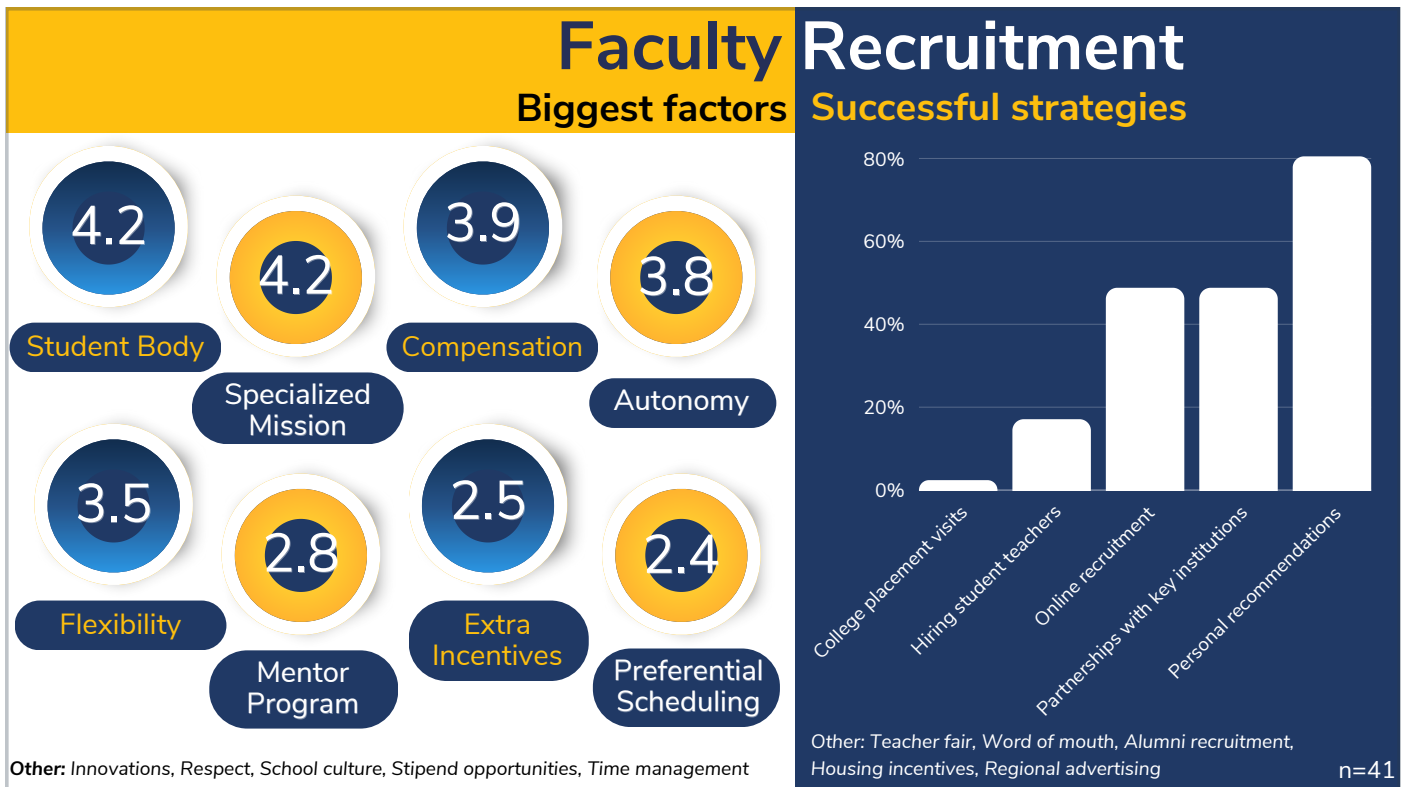
* Those reporting "no" usually could not report declared majors but could report approximate post-graduation plans

- Respondents either do not track alumni outcomes (16), track them using in house methods (8) or use the National Student Clearinghouse (14).

- Respondents not tracking alumni outcomes estimated a lower percentage of students attending college/university than those schools tracking outcomes.
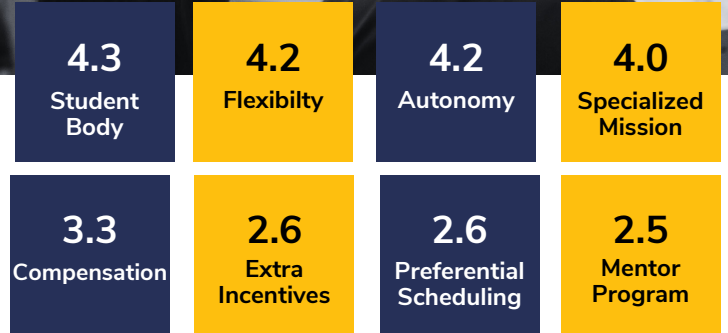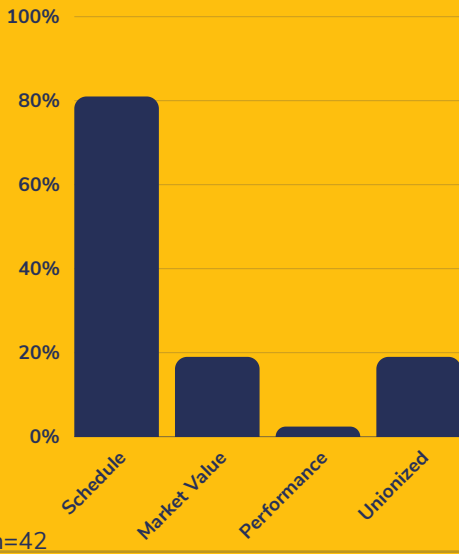
Faculty Recruitment
and Retention

Faculty Recruitment

Biggest factors

4.2 Student Body

4.2 Specialized Mission

3.9 Compensation

3.8 Autonomy

3.5 Flexibility

2.8 Mentor Program

2.5 Extra Incentives

2.4 Preferential Scheduling

Other: *Innovations, Respect, School culture, Stipend opportunities, Time management*

Successful strategies

Other: *Teacher fair, Word of mouth, Alumni recruitment, Housing incentives, Regional advertising*

n=41

Full list:
4.2 Class size/makeup student body
4.2 Specialized mission
3.95 Compensation
3.78 Autonomy
3.51 Flexibility
2.8 Strong mentor program
2.51 Extra incentives
2.39 Preferential scheduling
2.32 Tuition/supply reimbursement
2.24 Support with licensure
1.98 Affinity groups
1.8 Co-teaching or job share opportunities

Faculty Retention

Strategies for compensation

100%
80%
60%
40%
20%
0%

Schedule   Market Value   Performance   Unionized

n=42

| 4.3 Student Body | 4.2 Flexibilty | 4.2 Autonomy | 4.0 Specialized Mission |
| 3.3 Compensation | 2.6 Extra Incentives | 2.6 Preferential Scheduling | 2.5 Mentor Program |

Biggest factors in retaining faculty

Other: Leadership Culture, Respect, Stipend opportunities, Pipeline, Vision, Evaluation s

- **75% of strategies that are unionized also use a schedule**
- **25% of strategies that use market value also use a schedule**

Flexibility and Autonomy are switched with Specialized Mission and Compensation compared to recruitment ratings.

Full list:
4.3 Class size/student body
4.2 Flexibility
4.2 Autonomy
4.0 Specialized Mission
3.3 Compensation
2.6 Extra Incentives
2.6 Preferential Scheduling
2.5 Strong Mentor Program
2.4 Tuition/supply reimbursement
2.0 Licensure
1.9 Affinity Groups
1.6 Co-teaching or job share opportunities

Questions?

Thank you!

For additional questions, ideas about questions, or
to schedule a time to meet about the survey:

Todd.Mann@ncsss.org
Crystal.Miller@ncsss.org