COMMUNITY COLLEGE S-STEM NETWORK

Community College S-STEM Network (CCSN) Research and S-STEM Resources for ATE Projects

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HI-TEC Conference
July 30, 2026

This research is supported with funding from the U.S. National Science Foundation under grants 2224623 and DUE 2224671.

NSF S-STEM Program: Funding for Scholarships and Co-Curricular Supports

- The program provides awards to institutions of higher education (IHEs) to enable academically talented, low-income students to pursue successful careers in promising STEM fields.

- It funds scholarships, as well as the implementation of evidence-based curricular and co-curricular[a] activities to support recruitment, retention, transfer (if appropriate), student success, academic/career pathways, and graduation in STEM.

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NSF S-STEM Offers Opportunity to ATE Grantees

Dear Colleague Letter

NSF Scholarships in Science, Technology, Engineering, and Mathematics Program (S-STEM) Scholarship Supplements for Advanced Technological Education (ATE) Recipients

May 28, 2024

Invites active Advanced Technological Education program award recipients to submit supplemental funding requests to provide scholarship support to eligible students under the NSF Scholarships in S-STEM program.

https://www.nsf.gov/funding/opportunities/dcl-nsf-scholarships-science-technology-engineering-mathematics

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Core Components of Successful S-STEM Projects

Scholarships
The financial foundation — reducing barriers and creating space for full participation

Academic Support
Tutoring, advising, and supplemental instruction to keep students on track

Mentoring
Faculty, peer, and industry mentors providing guidance and connection

Career Development
Employer engagement, workforce preparation, and job placement support

Community Building
Cohorts, learning communities, and student events that build shared identity

Effective S-STEM projects integrate scholarships with a coordinated set of student support and development activities. ATE programs can adopt a similar model.

Discussion: Which of these components already exist in your ATE project? Which could be strengthened through S-STEM funding?

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Building on Existing Strengths

ATE Strengths

Employer Partnerships
Strong industry relationships anchoring mentoring and career development

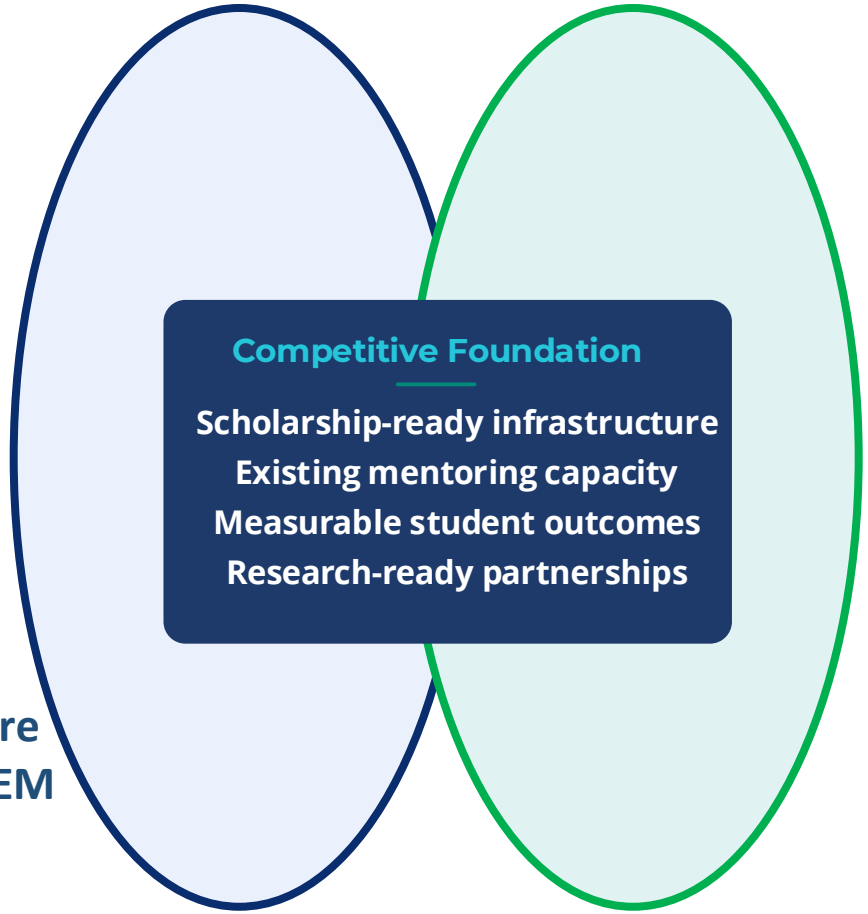
Technical Programs
Specialized, high-demand curriculum aligned with workforce needs

Workforce Alignment
Programs designed with employment outcomes in mind

Student Support Systems
Advising, tutoring, and student services infrastructure

Experienced STEM Faculty
Instructors with technical expertise and industry backgrounds

ATE institutions already have the core infrastructure for a compelling S-STEM proposal…



S-STEM Requirements

Scholarship Infrastructure
Financial aid system for academically talented, low-income students

Academic Support
Coordinated tutoring, advising, and supplemental instruction

Mentoring Program
Faculty, peer, and industry mentor relationships

Research Component
Commitment to studying practices and building evidence

Evaluation Plan
Tracking outcomes and contributing to the field's knowledge base

…They may just need to intentionally connect it to S-STEM requirements.

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The Community College S-STEM Network (CCSN)

The Community College S-STEM Network (CCSN) is a 5-year National Science Foundation (NSF) S-STEM Research Hub dedicated to generating and sharing research to promote the academic and professional success of scholastically-talented, low-income community college (CC) students majoring in science, technology, engineering and mathematics (STEM) disciplines.

This research is supported with funding from the U.S. National Science Foundation under grants 2224623 and DUE 2224671

CCSN Mission & Goals

Mission:

The Community College S-STEM Network (CCSN) connects and supports researchers and practitioners in conducting and translating research on how students navigate STEM pathways into evidence-based practices, programs, and policies.

Goals:

Generate and amplify research on community college S-STEM student decision-making and STEM pathways through student and grantee surveys, systematic reviews, and case studies

Share research outcomes with the S-STEM community and national stakeholders through networking and proposal workshops, leadership groups (professional and student), and research-to-practice clinics

Promote a collaborative and engaging S-STEM research community through partnerships and fellowships

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CCSN Research Hub Team

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Elizabeth Meza
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Will Tyson
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Senior Personnel

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Melissa Quaal
Senior Personnel

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CCSN Leadership Groups

Leadership advisory group, meets quarterly

Ann Murkowski, Professor of Biology, North Seattle College
Laurel Carpenter, Professor, Holyoke Community College
Annette Parker, President, South Central College
Renuka Prabhakar, Executive Dean, Everett Community College
Greg Rogers, Director IR, Polk State College
Tom Tubon, Executive Director, Miracosta College
Frankie Santos Laanan, Dean of the College of Education, University of Utah

Student leadership group, meets annually

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Primary Objectives

To establish and engage with a network of individuals and institutions to frame current issues associated with the education of low-income STEM majors in CCs and identify specific areas of research focus;

To undertake research on CC S-STEM programs to produce evidence and instruments to be shared with practitioners and researchers

To increase educational and social science research capacity within CC personnel, especially STEM faculty members.

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Overarching Research Questions

How do elements of the S-STEM program (i.e., recruitment and selection processes, the S-STEM scholarship, and S-STEM curricular and co-curricular supports) influence students' decisions to stay on or leave a STEM pathway?

How do institutional contexts including and beyond S-STEM (i.e., policies, practices, resources, and opportunities) influence students' decisions to stay on or leave a STEM pathway?

How do students' attributes (i.e., engagement and use of economic, social, and cultural resources) influence their decisions to stay on or leave a STEM pathway?

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Activities	Goals
Engaging and Building a Network	
• Leadership groups • Network building • Proposal workshops • Research-to-practice clinics • Dissemination	• Gather S-STEM grantees, educators, researchers, and other stakeholders interested in low-income CC STEM student decision-making and pathways • Share findings and promising practices
Generating Research Evidence and Tools	
• Grantee survey • Systematic review • Case studies • Student survey	• Conduct research and amplify existing research on low-income CC STEM student decision-making and pathways • Create research toolkits of methods and instruments
Expanding Research and Building Capacity	
• Research partnerships • Research fellowships	• Conduct additional research on low-income CC STEM student decision-making and pathways • Expand research capacity among CC S-STEM grantees • Engage and develop early career researchers in this research

CCSN Major Activities

- Research to inform practice on community college S-STEM & STEM pathways
  - Systematic literature review
  - Case studies
  - Surveys (grantees, students)
  - Partnerships
  - Research fellowships
- Resources to support community college STEM programs
  - Webinars held on bi-monthly basis
  - S-STEM proposal workshops for community colleges
  - Research-to-Practice clinics for community colleges

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Research to inform practice on community college S-STEM & STEM pathways

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CCSN Publications

Publications:

- *Community College S-STEM Programs: A Systematic Literature Review*, Meza & Espino
- *Retention of Academically Talented STEM Scholarship Recipients in Community College*, Meza, Espino and Bragg
- *Beyond Financial Aid: Relational and Cultural Supports as Systemic Drivers of STEM Success for Community College Students,* Meza & Espino
- *Fostering STEM Success in Community Colleges: The Integration of Culturally Relevant Responsive Pedagogy and Community Cultural Wealth Models for Students,* Meza
- *How NSF S-STEM Scholarships Impact Community College Transfer Decision-Making,* Meza
- *From Staff to Students: Centering Critical Relevant Pedagogy and Community Cultural Wealth in S-STEM program,* Espino

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CCSN Presentations

Presentations:

- *Beyond Financial Aid: Relational and Cultural Supports as Systemic Drivers of STEM Success for Community College Students,* Espino, Meza, Bragg & Tyson (AERA 2026)
- *Translating Learnings from STEM Scholarship Winners Into Effective Strategies for Fostering Student Success,* Espino, Van Noy, Tyson & Bragg (CCSC 2025)
- *Lighting the Path: What Community College S-STEM Scholars Teach Us About Actionable Strategies,* Espino, Meza and Tyson (ASHE 2025)
- *Systemic Literature Review of S-STEM Programs in Community Colleges*, Espino & Meza (ASEE Conf 2024)
- *How Community College Transfer S-STEM Scholars in Engineering Spend Scholarship Funds to Enhance Their Academic Success*, Tyson et al. (ASEE Conf 2024)
- *A Systemic Review of S-STEM Programs and Community College Students in STEM Decision-Making,* Espino & Meza (CSCC Conf 2024)

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CCSN Literature Briefs

Literature review briefs synthesize key findings from the research:

- STEM Mentorship in Community College: Building Pathways for Success
- Sense of belonging in Community College STEM: Why It's Important and How to Create More
- STEM Pathways and Community College Decision Making
- Empowering Inquiry: Understanding Undergraduate Research at Community College
- Understanding Transfer Shock Among Community College Students
- Supporting STEM Student Athletes at Community College

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CCSN Strategy Briefs

Strategy briefs highlight notable practices:

- Overview of the Grantee Survey: NSF S-STEM Principal Investigators on the Effectiveness of Advising, Academic Support, and other Program Elements Toward Promoting STEM Pathways for Two-Year College Students and Transfer,
- Building Connections in a Community: the role of an Open, Faculty-Staffed Study Hall in S-STEM Scholar Persistence
- Using National Student Clearinghouse Data to Track Community College STEM Transfer Students
- Sense of belonging and STEM identity in S-STEM program supports

Briefs under development:

- Transfer-Centered Framework For S-STEM Scholars
- Community College Presidents on S-STEM Student Outcomes
- Fostering Belonging in Community College STEM Students through Compensated Community Model
- Addressing Basic Needs in Community Colleges
- Faculty Mentoring
- Workforce Readiness Supports
- Evaluating STEM Through Students Eyes

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CCSN Research Fellowships

CCSN Fellows are early career researchers, which participate in a 15-month summer-to-summer fellowship aimed at building capacity within the CCSN research community. Under the guidance of Dr. Will Tyson and the CCSN leadership team, fellows work directly with S-STEM practitioners to conduct joint research projects that build upon the CCSN's portfolio of ongoing research activities:

Margaret Ann Bolick
2025-26 Fellow

Chauntee Thrill
2025-26 Fellow

Esmeralda Martinez Maldonado
2026-27 Fellow

Daniel Adeniranye
20256-27 Fellow

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Resources to support community college STEM programs

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Research-to-Practice Clinics, 2025

CCSN's Research to Practice clinics promote student engagement and successful navigation of STEM pathways by sharing research-backed strategies from our network of researchers in small group, in-depth virtual sessions for colleges and practitioners.

- **April:** A Compensated Community Model for Fostering Belonging in Community College Transfer Students, Will Tyson, Ph.D.
- **May:** The Case of Corequisite Remediation: Evidence From Higher Education Research, Dan Douglas, Ph.D.
- **June:** Creating a sense of belonging for STEM success: Cohorts and other strategies, Elizabeth Meza, Ph.D.
- **July:** Mentoring: Helping to Navigate Complex Pathways Toward Higher Education and Work, Maria L. Espino, Ph.D.,
- **August:** STEM Pathways and Decision Making: Insight from the Research Literature, Debra D. Bragg, Ph.D.
- **September:** Career Preparation Strategies in STEM Fields, Mary Slowinski and Rachel Bower

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Research-to-Practice Clinics, 2026

- **March:** Embedding Intentional Mentoring for Community College STEM Students: Moving from transactional advising to identity-affirming ecosystems, Maria Espino, Ph.D.
- **April:** Corequesite Remediation and Student Success, Dan Douglas, Ph.D.
- **May:** Compensated Community Model for Fostering Belonging in Community College Transfer Students, Will Tyson, Ph.D.
- **June:** Create a Sense of Belonging for STEM Success, Elizabeth Meza Ph.D.

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Proposal Writing Workshops

- Virtual workshops, led by former NSF program officers, to assist two-year colleges to develop and submit proposals to the National Science Foundation Scholarships in Science, Technology, Engineering, and Mathematics Program (S-STEM).

- **Details:** Workshops are instructor-led, live online with no cost for two-year faculty and staff. Meetings occur Fridays at 3:30pm ET

- **Who Should Attend:** STEM faculty, deans, associate deans or department chairs, institution grant officials, and student support services directors

Learn More:

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CCSN Webinars

Webinars include researchers and community college practitioners discussing a range of topics to inform practice in community college STEM programs:

- Community College S-STEM Program Elements to Support Student Success
- Beyond Financial Aid: Relational and Cultural Supports as Drivers of STEM Success
- Bolstering Basic Needs: Key Insights from the 2024-25 Benefits Promotion Pilot
- Community College Leadership Supporting Success for STEM Education and NSF Scholarships
- Lessons from the Field on Successful Community College S-STEM Grant Proposals
- CCSN Showcase – Here, Now and What's Next
- Building STEM Identity, and Enhancing Partnerships
- What Culture is Relevant for STEM Community College Transfer Students?
- Mentoring Moments: Helping Students Tune into Feedback
- Lessons from Research & Evaluation of NSF: SAGE 2YC Faculty as Agents of Change
- Community College Student Decision Making in IT Programs
- Systematic Literature Review on Community College S-STEM Programs
- The Challenge and Promise of Building Equitable STEM Transfer Pathways
- Community College STEM Student Motivations, Decisions, and Pathways

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CCSN Webinar, June 2026

Community College S-STEM Program Elements to Support Student Success

Will Tyson, University South Florida
Gabriel Mast, Skagit Valley College
Jan Edwards, College of Lake County

Learn about the activities of S-STEM community college grantees! This conversation with Will Tyson, Gabriel Mast, PhD and Jan Edwards shares research results from S-STEM Principal Investigator survey on program element effectiveness, including findings on advising, academic supports, and a range of other program elements. S-STEM PIs Jan Edward of College of Lake County and Gabriel Mast of Skagit Valley College shared perspectives from their work and implications of findings for community colleges.

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Join us at Upcoming CCSN Webinars!

- **September 24:**
  - **Characteristics of Successful Community College Grant Ecosystems** with Shalee Hodgson and Ben Reid of *Impact Allies,* CCSN's Will Tyson and Annette Parker, former president of *South Central College*

- **December:**
  - **S-STEM Student Perspective,** details TBD.

Register Here:

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Unpacking S-STEM Grants:

Findings from a Survey of Community College S-STEM PIs on the Effectiveness of Advising, Academic Support, and Other Program Elements Toward Promoting STEM Pathways for Two-Year College Students and Transfers

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The Challenges Community College Students Face

> *Low-income STEM students face compounding barriers — financial, social, and academic — that financial aid alone cannot resolve, motivating a comprehensive programmatic response.*

- Financial hardship is a primary driver of STEM attrition among low-income students, yet cost alone does not explain dropout
- Additional barriers include work and family obligations, lack of college-navigation skills, absence of social support networks, and academic under-preparedness
- Six-year bachelor's completion rates reveal persistent inequity by income and race, underscoring the urgency of targeted intervention
- Structured scholarship programs, paired with evidence-based support activities, are studied as the path to improving outcomes for underrepresented students

Key Barriers to STEM Completion

Financial
Tuition, living costs & unmet financial need

Social
Work & family obligations, limited peer networks

Academic
Under-preparedness & limited faculty mentorship

Navigational
Lack of college-navigation skills & guidance

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NSF Scholarships in STEM (S-STEM)

S-STEM pairs significant last-dollar financial aid with five types of locally-designed programmatic supports to improve academic and career outcomes for low-income STEM students.

Financial Support Model

Target Population
Academically talented low-income STEM students; award amounts determined by each scholar's unmet financial need.

Last-Dollar Aid Model
Scholarships cover a substantial portion of tuition and related expenses after other aid is applied.

Award Amount — Undergraduate
Up to **$15,000/student/year** — increased from **$10,000** in the FY2023 cycle.

Research gap: Limited comparative evidence exists on which supports are most widely implemented, consistently reach students, or are most effective for GPA, persistence, transfer, and job placement. The present study addresses this gap using descriptive evidence from S-STEM projects serving community college students nationwide.

Five Locally-Designed Programmatic Supports

Not uniformly mandated by NSF — variation in prevalence, use, and perceived effectiveness observed across projects.

Mentoring
Academic guidance, socialization into disciplinary norms, and timely problem-solving through faculty and peer mentoring.

Cohort Strategies
Foster peer networks, strengthen sense of belonging, and normalize help-seeking behaviors among students.

Academic Support
Tutoring, skills workshops, early alerts, cohort classes, and first-year STEM seminars to address coursework demands directly.

Career Preparation
Research opportunities, speaker series, field trips, and networking; internships and job placement where institutional and employer partnerships permit.

Transfer Support
Key for community college students — clarifies requirements and reduces friction at the two-to-four-year interface.

This research is supported with funding from the U.S. National Science Foundation under grants 2224623 and DUE 2224671

Literature Review

The literature converges on four targeted alignments — each pairing a program element with specific student outcomes.

Mentoring & Cohorts
→ **Persistence**

Faculty and peer mentoring address transfer shock and strengthen social integration. Structured face-to-face engagement is associated with higher connectedness, satisfaction, and social capital among undergraduate engineers.

Tutoring, Learning Communities & First-Year Seminars
→ **GPA**

Combined tutoring, study spaces, and faculty advising are associated with higher GPAs in high-enrollment STEM courses, stronger term-to-term persistence, and better continuation in gateway mathematics and chemistry courses.

Pre-Transfer Advising & Pathway Alignment
→ **Transfer**

Coherent pathway alignment and proactive, dedicated advising counter lost credits, weak cross-institution communication, and slower time-to-degree caused by advising workload pressures and program restrictions.

Internships, Undergraduate Research & Networking
→ **Employment**

Career preparation blending exposure with experience. Internships are associated with greater perceived preparedness and expectancy of success in obtaining preferred first positions.

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Methodology

- **Purpose:** To understand how S-STEM programs support community college students in completing STEM education and launching STEM careers
- **Sample:** Principal Investigators, Co-PIs, and Staff from S-STEM grants awarded between 2018-23 involving community college students (102 from 79 projects)
- **Classified into four categories:**
  - CC Led Grants (79 sent, 39 responded, 49%)
  - Collaborative Grants with CC (35 sent, 10 responded, 29%)
  - 4-Year Led Grants with Named CC Partners (58 sent, 24 responded, 41%)
  - 4-Year Led Grants with Unnamed CC Partners (16 sent, 6 responded, 38%)

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Study Design and Research Questions

A cross-sectional national survey of 102 S-STEM project leaders across 79 projects provides comparable, system-level descriptors of practice prevalence, student use, and perceived effectiveness.

Three Descriptors Collected

Per program element

- **Prevalence** — Is the element offered?
- **Frequency of use** — Do students actually use it?
- **Perceived effectiveness** — Does it improve outcomes?

Study design: Cross-sectional survey of PIs, Co-PIs, and staff from active NSF S-STEM awards (2018–2023) involving community colleges

Respondents: 102 investigators from 79 projects

Five Sets of Program Elements

Areas of support analyzed

- Advising
- Career Preparation
- Social Support
- Academic Support
- Transfer Support

Four Student Outcomes

Effectiveness measured against

- **GPA** — Academic performance
- **Persistence** — Toward degree completion
- **Transfer** — To a four-year university
- **Job Placement** — Employment outcomes

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Program Elements by Category and Prevalence

Program elements were identified through a systematic literature review (Espino & Meza, 2024)

Advising	Career Preparation & STEM Identity Development	Social Support & Outreach	Academic Support	Transfer Support
Faculty mentoring	Research opportunities	Regular cohort meetings	Tutoring	Pre-transfer advising
Peer mentoring	Internship opportunities	Clubs	Summer bridge program/bootcamp/workshop	Post-transfer advising
Intrusive or enhanced advising	Professional mentoring	Conferences	Learning community	Formal CC & University STEM collaboration
Dedicated student success coach / specialist / coordinator	Field trips/tours/visits to industry or colleges	Competitions	Supplemental Instruction	Pathways alignment with university
Advising & transfer workshops	STEM professional speaker series	Civic engagement	1st year seminar/STEM success course	
Individualized education/career plan	Job shadowing	Community service	Academic skills workshops	
	Job placement supports	Service learning	"Soft skills" workshops	
	Networking opportunities and events	Equity focused STEM identity development workshops	Early alert system	
	Career exploration/counseling		Cohort classes	

Faculty mentoring, regular cohort meetings, and pre-transfer advising stand out as the backbone of S-STEM programming — implemented in seven to eight of every ten projects. (Top 10 most common spotlighted)

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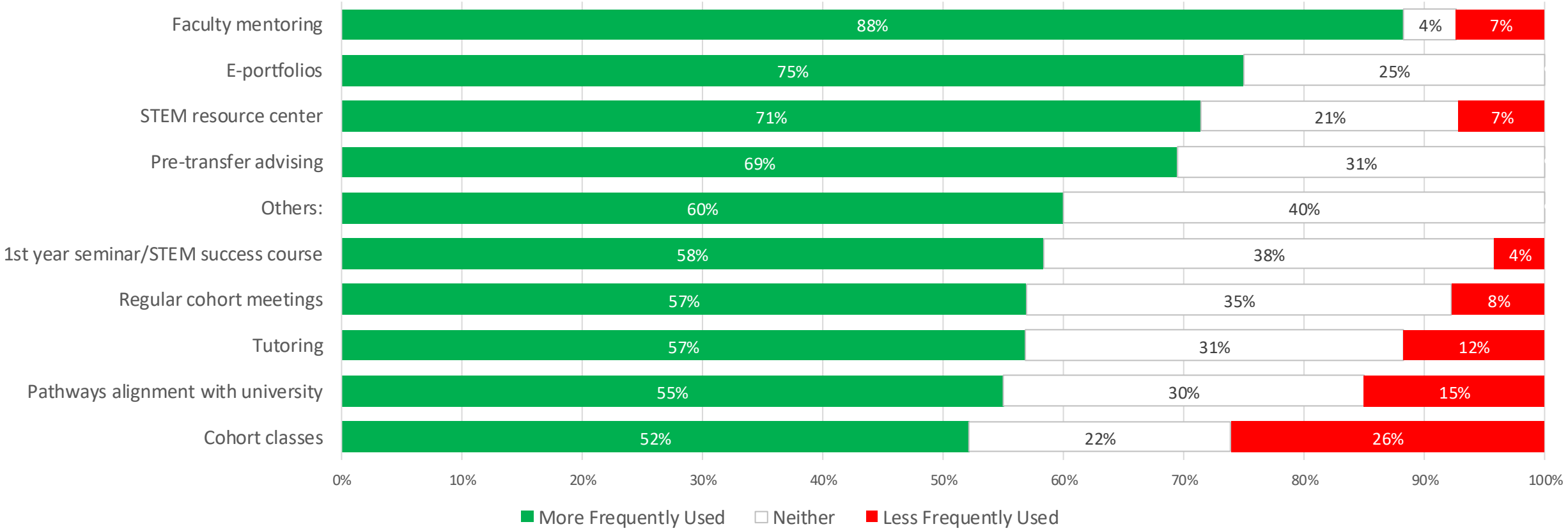
Which Elements Do Students Actually Use?



Key Findings among Implementers

- **Faculty mentoring** : 88.2% most frequently used — highest of all elements
- **Net use leaders** : Faculty mentoring (+80.9), First-year seminar (+54.2), Regular cohort meetings (+49.2)
- **Lowest net use** : Service learning (−60.0) Job shadowing (−20.0), Supplemental Instruction (−7.7)

Students gravitate toward high-touch, relationship-based supports and structured academic activities — but frequency of use varies widely even among projects that offer the same element.

Practical Advice

Offering an element does not guarantee student engagement — scheduling, incentives, and intentional design determine whether students actually show up.

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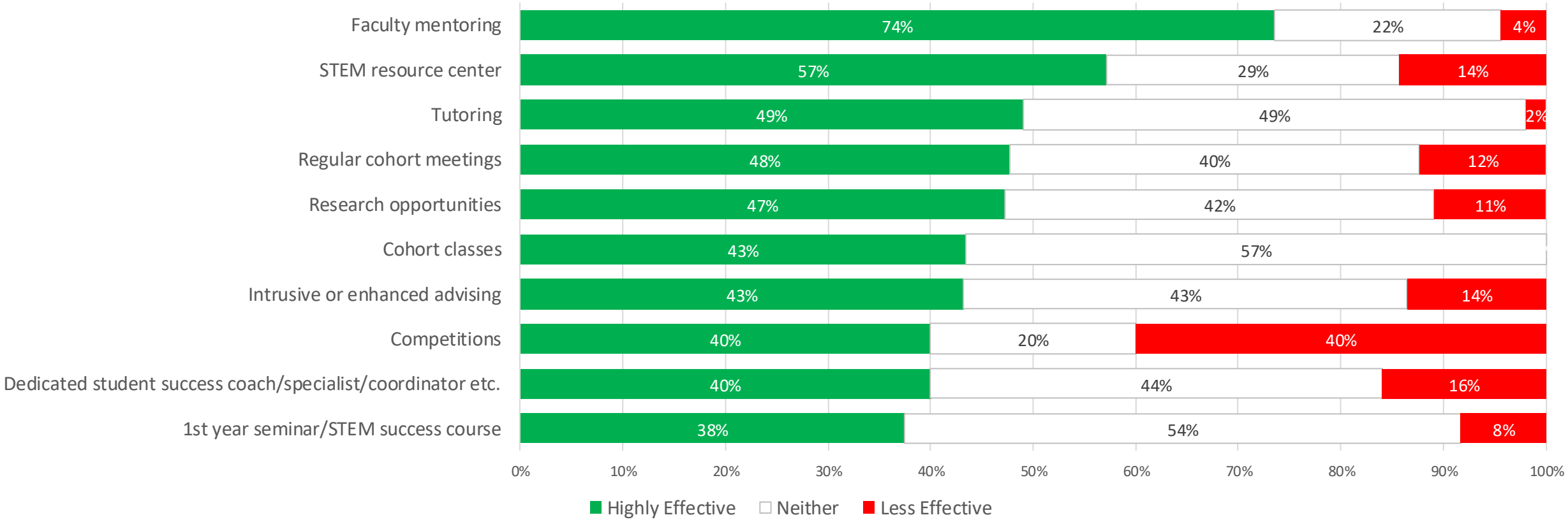
Effectiveness for Improving GPA



Key Findings among Implementers

- **Faculty mentoring** leads: net +69.1 (73.5% rated highly effective)
- **Tutoring** +47.1 and **Cohort classes** +43.5 — strong academic performance signals
- Career-preparation and social-support activities receive more modest GPA ratings

Direct academic scaffolds — tutoring, cohort classes, and first-year STEM seminars — are the strongest perceived levers for improving student academic performance.

Practical Advice

Protect time and staffing for tutoring in gateway STEM courses; add a first-year STEM seminar or learning community.

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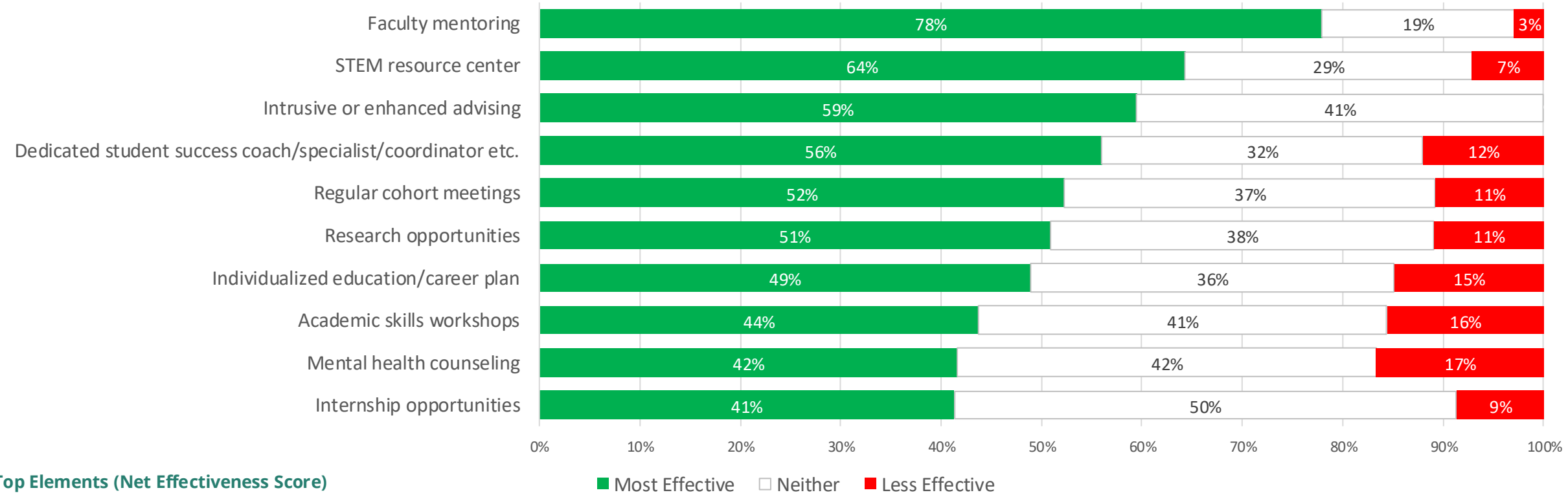
Effectiveness for Improving Persistence



Top Elements (Net Effectiveness Score)

- **Faculty mentoring:** +75.0 net (77.9% highly effective)
- **Intrusive/enhanced advising:** +59.5
- **Dedicated student success coach:** +44.0
- **Regular cohort meetings:** +41.5
- **Research opportunities:** +40.0
- Five social-support elements showed **negative** net persistence ratings (e.g., civic engagement: −50.0)

Relationship-centered supports — especially faculty mentoring and structured cohort activities — produce the strongest persistence signals across all five domains.

Practical Advice

Formalize faculty mentoring and schedule predictable cohort meetings — give students a reason to be on campus with peers and mentors.

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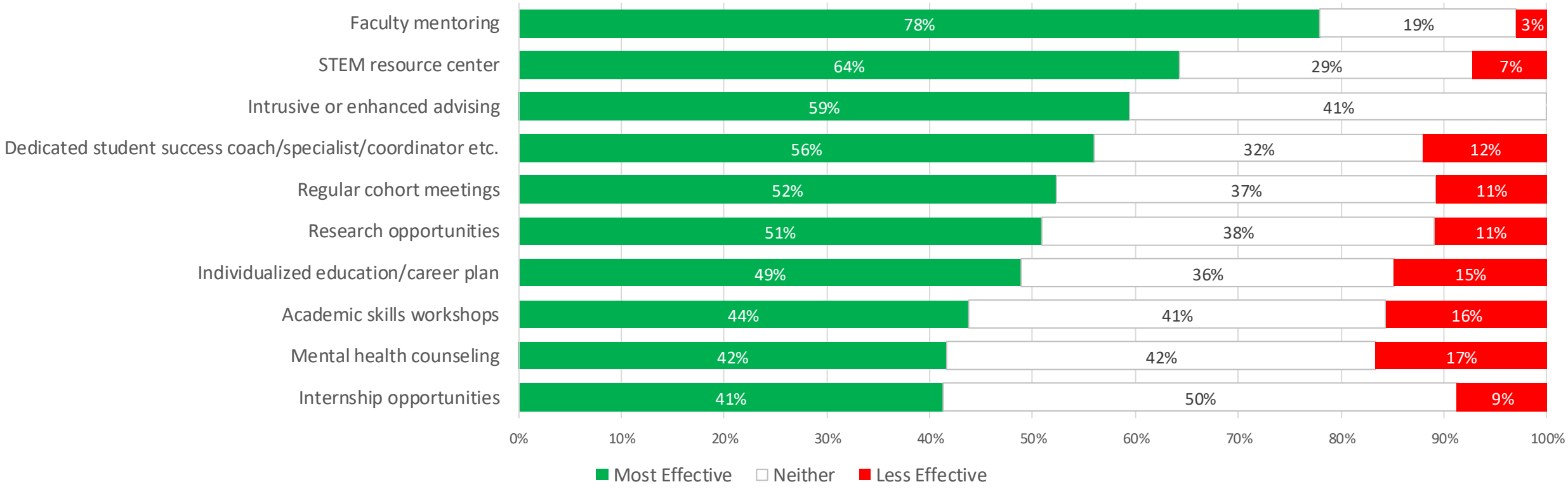
Effectiveness for Improving Transfer



Top Elements among Implementers

- **Pre-transfer advising:** +66.1 net rating (67.8% highly effective)
- **Faculty mentoring:** +52.9 net rating
- **Formal CC & University STEM collaboration:** +46.9
- **Pathways alignment with university:** +40.0
- **Dedicated student success coach:** +40.0

Pathway-structuring activities — pre-transfer advising, formal CC–university collaborations, and pathways alignment — are the dominant drivers of perceived transfer effectiveness.

Practical Advice

Begin pre-transfer advising in the first term; co-develop degree maps and articulation agreements with receiving universities. Post-transfer advising shows lowest net rating (−9.1) — students

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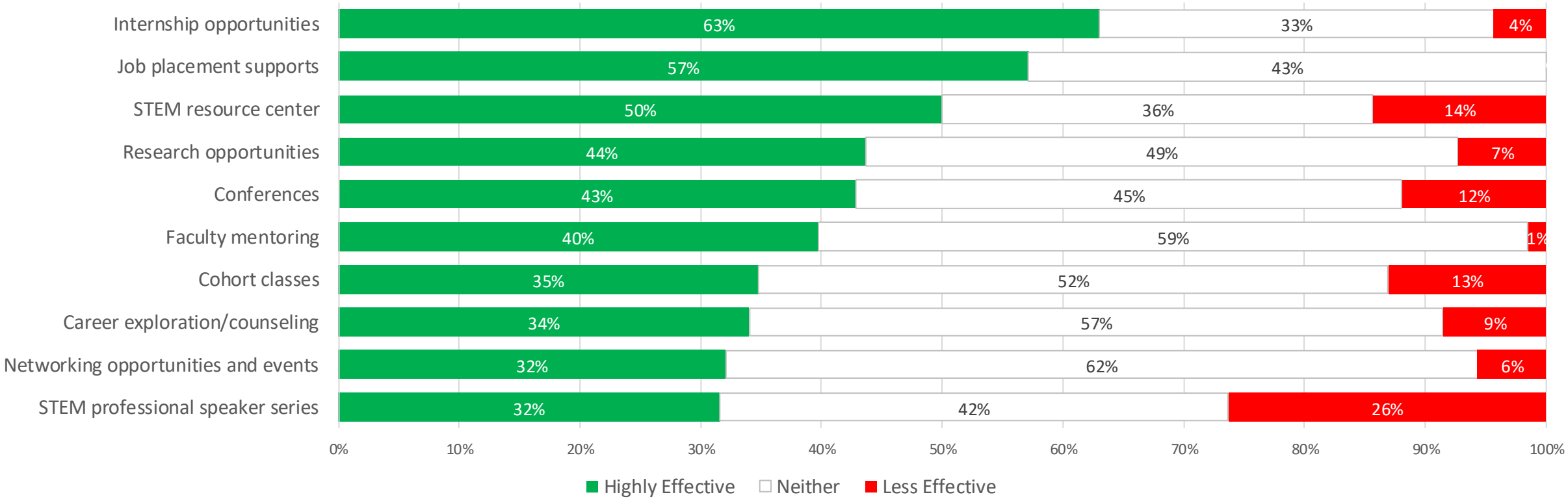
Effectiveness for Improving Job Placement



Top Elements among Implementers

- **Internships:** +58.7 net rating (63% highly effective)
- **Job placement supports:** +57.1 net rating
- **Research opportunities:** +36.4
- **Faculty mentoring:** +38.2
- **Professional conferences:** +31.0

Work-based experiential activities stand apart as the clearest perceived drivers of employment outcomes.

Practical Advice
Build toward paid internships by first strengthening research exposure and employer relationships — these are the foundational steps.

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Three Cross-Cutting Patterns

The data converge on three coherent, literature-aligned design principles that can guide program development regardless of S-STEM funding.

Pattern 1

Persistence & GPA

Relationship-Centered Supports

- Faculty mentoring and regular cohort meetings are the most prevalent, most frequently used, and most effective elements for persistence and GPA
- Consistent, face-to-face engagement builds belonging, connectedness, and academic identity

Pattern 2

GPA

Direct Academic Supports

- Tutoring, cohort classes, and first-year STEM seminars produce the strongest academic performance signals
- Career and social activities complement but do not substitute for targeted academic scaffolding

Pattern 3

Transfer

Pathway-Structuring Activities

- Pre-transfer advising, pathways alignment, and formal CC–university collaborations dominate transfer effectiveness
- Early, coordinated, cross-institutional navigation reduces transfer friction and lost credits

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Questions/Discussion

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For More Information

COMMUNITY
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S-STEM
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This research is supported with funding from the U.S. National Science Foundation under grants 2224623 and DUE 2224671