



*April 2015*



# CENTERED ON RESULTS

*Assessing the Impact of Student-Centered Learning*

*Nellie Mae Education Foundation*

## ABOUT THE NELLIE MAE EDUCATION FOUNDATION

The Nellie Mae Education Foundation is the largest philanthropic organization in New England that focuses exclusively on education. The Foundation supports the promotion and integration of student-centered approaches to learning at the high school level across New England—where learning is personalized; learning is competency-based; learning takes place anytime, anywhere; and students exert ownership over their own learning. To elevate student-centered approaches, the Foundation utilizes a four-part strategy that focuses on: building educator ownership, leadership and capacity; advancing quality and rigor of student-centered learning practices; developing effective systems designs; and building public understanding and demand. Since 1998, the Foundation has distributed over \$210 million in grants. For more information about the Nellie Mae Education Foundation, visit [nmeeducation.org](http://nmeeducation.org).

## ACKNOWLEDGEMENTS

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## *Introduction*

Today we have more information than ever about what students need to succeed in school. We know, for example, that young people learn best when they feel positive about the learning process, experience strong connections with others, perceive value in the task at hand, believe that their efforts will pay off, and have the skills to be successful. Over the past several years, the Nellie Mae Education Foundation (Nellie Mae) has invested in connecting the dots across diverse areas of research on the optimum conditions for student learning through the [Students at the Center](#) initiative. This work has shaped the foundation's definition of student-centered learning—the instructional practices that support children and youth to learn deeply and achieve long-term success.

While many of the concepts and approaches that comprise student-centered learning have deep roots in learning theory, the cognitive sciences, and youth and child development, empirical research on student-centered learning's impact in K-12 classrooms remains limited. To address this gap, Nellie Mae recently commissioned a series of studies that evaluate the effects of a variety of student-centered practices in secondary schools. The outcomes of the studies were largely positive, demonstrating meaningful effects on student achievement and engagement. The studies also help illustrate what student-centered learning can look like in a range of contexts, including high school math classrooms, STEM courses that blend online and in-person learning, and whole-school models that infuse student-centered practices throughout the curriculum.

Together, these studies strengthen the evidence base for those seeking to identify practices that will produce the greatest benefits for students. Furthermore, they provide new insights into how to achieve the highest outcomes equitably. These studies look at how to ensure that all students—including those in underserved groups—get an opportunity to reach the common goal of college and career readiness.

We hope school leaders, teachers, and others can draw on the highlights we present here to enhance their own efforts to improve student outcomes. From these studies and others (Conley 2012; Farrington, Roderick et al. 2012; Darling-Hammond and Falk 2013; Mehta 2013; Wolfe, Steinberg et al. 2013; Hess and Gong 2014; Zeiser, Taylor et al. 2014; see [studentsatthecenterhub.org](http://studentsatthecenterhub.org) for additional research), we've learned a great deal about what it takes to deepen student learning and build skills for long-term success. Now, it's time to equip all young people with the rich learning opportunities they need to thrive in school and beyond.



## *What is Student-Centered Learning?*

Student-centered learning does not represent a single curriculum, model, or practice. Rather, it draws on a variety of concepts in education, the brain sciences, and the child and youth development fields, comprising those instructional practices that engage individuals in learning deeply and reaching their highest potential.

Nellie Mae has identified four tenets of student-centered learning:

- **Learning is personalized:** Personalized learning recognizes that students engage in different ways and in different places. Students benefit from individually-paced, targeted learning tasks that start from where the student is, formatively assess existing skills and knowledge, and address the student's needs and interests.
- **Learning is competency-based:** Students move ahead when they have demonstrated mastery of content, not when they've reached a certain birthday or endured the required hours in a classroom.
- **Learning happens anytime, anywhere:** Learning takes place beyond the traditional school day, and even the school year. The school's walls are permeable – learning is not restricted to the classroom.
- **Students take ownership over their learning:** Student-centered learning engages students in their own success – and incorporates their interests and skills into the learning process. Students support each other's progress and celebrate success.

## *Take a Closer Look*

The following pages offer highlights from three studies commissioned by Nellie Mae to examine student-centered learning in depth—what it looks like, and how students may benefit. Each study examined a different aspect of this developing approach:

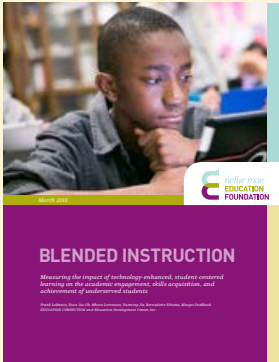
- [Blended Instruction: Measuring the Impact of Technology-Enhanced, Student-Centered Learning on the Achievement, Academic Engagement, and Skills Acquisition of Underserved Students](#). EDUCATION CONNECTION, 2014.
- [An Up-Close Look at Student-Centered Math Teaching: A Study of Highly Regarded High School Teachers and Their Students](#). The American Institutes of Research, 2014.
- [Student-Centered Schools: Closing the Opportunity Gap](#). Stanford Center for Opportunity Policy in Education, 2014. (multiple publications)

To view related research and tools produced through our Students at the Center initiative with Jobs for the Future, visit: [studentsatthecenterhub.org](http://studentsatthecenterhub.org)



# Study 1

## BLENDED INSTRUCTION: HARNESSING TECHNOLOGY TO DEEPEN STUDENT ENGAGEMENT AND LEARNING



To access the full study, *Blended Instruction: Measuring the Impact of Technology-Enhanced, Student-Centered Learning on the Achievement, Academic Engagement, and Skills Acquisition of Underserved Students*, visit: [www.nmefoundation.org/resources](http://www.nmefoundation.org/resources).

As digital technologies feature evermore prominently in schools and students' lives, educators face new questions about how to best harness technology's strengths to further student learning. When used well, many new and emerging technologies can help teachers to personalize instruction, foster collaboration, and engage students more deeply with the curriculum. It is an area ripe for innovation and research.

STEM21 Academy offers a promising approach. The program engages cohorts of grades 9-12 students in courses that

blend online learning with in-person support and through which students simultaneously master digital media skills and advanced content in the sciences. STEM21 Academy's approach to blended learning exemplifies many elements of student-centered learning and includes four core components.

1. **Technology-enhanced learning:** Students access differentiated learning activities and participate in tutorials, online forums, and other forms of virtual interaction through an online platform. The teacher serves primarily as a facilitator, supporting students via messaging, online posts, and discussion forums, as well as one-on-one time in the classroom.
2. **Experiential learning:** Students collaborate with professionals through off-campus meetings, online video conferences, in-person interviews, guest lectures, and an end-of-year exposition.
3. **Digital portfolios:** Students document and showcase their work on personal websites, using this medium to define their interests, demonstrate expertise, and celebrate growth.
4. **Proficiency assessments:** Authentic, project-based assessments allow students to make choices about

Figure 1: STEM21's Priority Skills for 21st Century Success

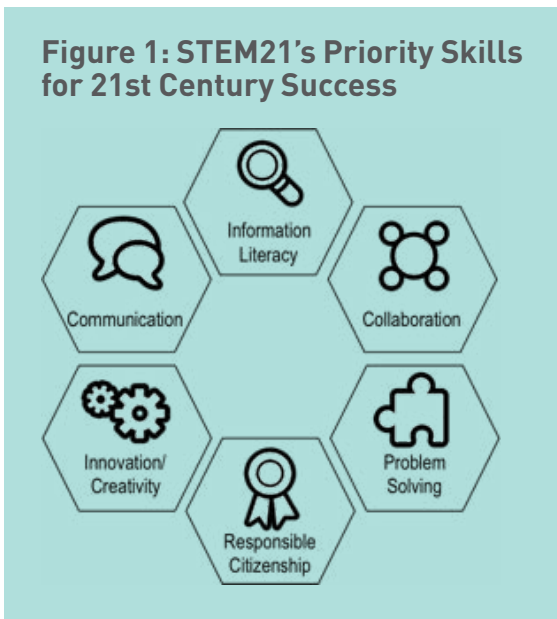
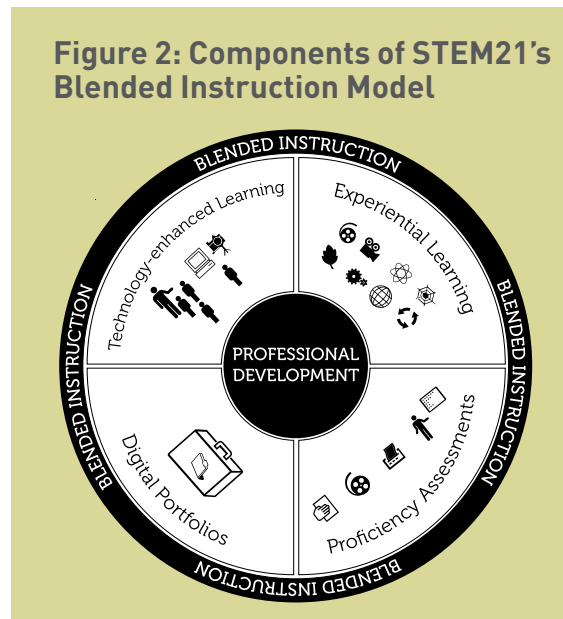


Figure 2: Components of STEM21's Blended Instruction Model





how they demonstrate mastery. Every course culminates in a Challenge Project through which student teams develop, research, and present a solution to an open-ended, real-world problem.

## STUDY DESIGN

EDUCATION CONNECTION conducted a mix-methods study of 9th-grade STEM21 students in 12 urban schools in Massachusetts and Connecticut. Students were compared with demographically similar peers in the same schools, using a matched-sample approach to control for baseline results. The researchers sought to discover the impact of one year of STEM21 Academy participation on:

- science achievement (Terra Nova assessment)
- engagement in science and math (survey)
- development of 21st century skills (survey)

The researchers conducted interviews with students and focus groups with teachers to further elucidate the results.

## FINDINGS: POSITIVE OUTCOMES, ESPECIALLY FOR ACHIEVEMENT

The results of the study were generally positive, with a significant impact on the ultimate measure: *increased science achievement*.

**Increased achievement in science:** Participation in the STEM21 Academy significantly increased student achievement in science across the entire sample. At the end of 9th grade, students in the STEM21 Academy group had an average score of 695.8 on the Terra Nova test of science theory and methods, compared with an average score of 683.7 in the comparison group. *Underserved students, female students, racial minorities, and students receiving free or reduced-price lunch experienced a similarly positive increase relative to their non-STEM21 Academy peers.*

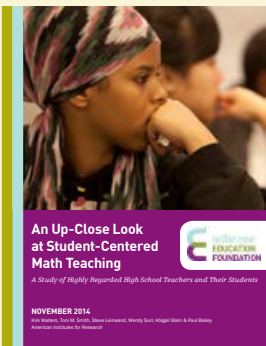
**Some impact on skills:** At the end of one year, STEM21 students saw a marginal increase in their 21st century and inquiry skills relative to their non-STEM21 peers.

**No significant differences in engagement:** One year of STEM21 Academy exposure did not result in a significant increase in academic engagement by the measures used in this study.

**Positive perceptions:** Students and teachers overwhelmingly reported positive impacts on learning as a result of STEM21's blended instructional approach. They expressed the most enthusiasm about the experiential learning components of the program and the extended Challenge Projects.

## Study 2

### FOR THE LOVE OF MATH: STUDENT-CENTERED LEARNING IN SECONDARY MATH



To access the full study, *An Up-Close Look at Student-Centered Math Teaching: A Study of Highly Regarded High School Teachers and Their Students*, visit: [nmeffoundation.org/resources](http://nmeffoundation.org/resources)

In an era of expanding—and exciting—career opportunities for those with strong problem-solving skills and mathematical facility, far too many students continue to experience mathematics as a rote subject to be endured. Traditional math instruction is likely part of the problem, contributing to lower levels of engagement and widespread underachievement that limits opportunities for individuals and threatens the strength of the nation’s workforce. As the calls for better STEM instruction increase in intensity—and the new Common Core State Standards push students to apply mathematical concepts and formulate and solve complex problems—educators struggle to find ways to engage students deeply in math, helping them master rigorous content and discover value and meaning in mathematical thinking.

The American Institutes for Research (AIR) set out to explore how student-centered instruction influences engagement and achievement in the classrooms of highly regarded high school math teachers. While many aspects of student-centered learning apply across all subject areas, the research focused on four practices that are math specific:

1. Students use mathematical reasoning to understand the “why” as well as the “how.”
2. Students communicate their thinking and critique the reasoning of others.
3. Students make connections between and among mathematical concepts and real-world concepts.
4. Students engage and persevere in solving complex mathematical problems.

#### STUDY DESIGN

The study sample includes 22 highly regarded math teachers whose teaching styles represent a mix of more traditional and student-centered approaches. Researchers used scored observations of classroom videos, sample assignments, and teacher surveys to assign each teacher a composite measure of student-centeredness, and then used two quantitative methods to measure the impact of student-centered practices on student engagement (as measured by a student survey) and problem-solving skills (as measured by a brief, validated assessment).

### Techniques that Foster Student-Centered Learning in Math

#### DISCUSSION TECHNIQUES

- Focus on the “why” as well as the “how.”
- Encourage students to justify and explain their solution strategies.
- Encourage students to critique the mathematical reasoning of others.
- Support students by advancing, but not taking over, their thinking as they engage in productive struggle with mathematics.

#### INSTRUCTIONAL TASKS

- Allow for multiple entry points and solution methods.
- Challenge students to reason about mathematics by looking for patterns, make conjectures, conduct explorations, examine connections between and among concepts, and justify solutions.
- Make explicit the connections between mathematics and real-life experiences.
- Encourage the use of different tools, including technology, to explore and solve problems.
- Provide collaborative opportunities for students to communicate about and critique each other’s reasoning.





They took a deeper look at seven classrooms, using case studies to provide rich descriptions of how more student-centered and more traditional lessons play out in daily lessons. Teachers and students provided additional insights through interviews and focus groups.

### **FINDINGS: BENEFITS INCREASE WITH STUDENT-CENTERED PRACTICE**

The researchers quickly discovered that the teachers fell along a continuum of practice; most implemented a mix of traditional and student-centered techniques. They found that teachers who implemented student-centered approaches most regularly:

- **Believed in the importance of student-centered methods**, attesting to the value of providing students with opportunities to explore, communicate, and reason in mathematics.
- **Worked in schools that focused on preparing students** for a variety of future pathways and that emphasized a broad set of life skills over test scores and other traditional markers of achievement, such as Advanced Placement course participation.
- **Had flexibility in lesson design and access to materials**, including textbooks that support more exploratory learning.

Students in the target classrooms had positive things to say about all of the highly regarded teachers in the study, but the benefits increased for those with teachers who implemented student-centered practices most regularly.

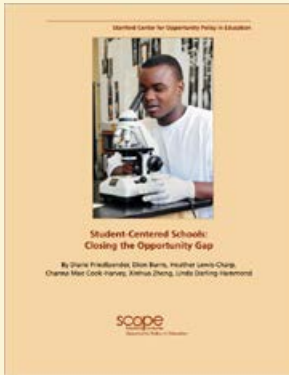
Furthermore, these differences resulted in measurable, positive outcomes for students. Students who are engaged in class are able to learn more, achieve more, and develop deeper connections to the subject area. In this study, *students in the more student-centered classrooms reported both higher levels of engagement and having learned more in class.*

The true test of any approach is whether it actually improves student learning. In this study, students in all classrooms took a portion of the internationally validated PISA math test, which emphasizes the kinds of conceptual math skills that students will need in the workforce. Holding constant prior math achievement, *students in more student-centered classrooms scored significantly higher.*



## Study 3

### **STUDENT-CENTERED SCHOOLS: ADDRESSING THE OPPORTUNITY GAP IN FOUR CALIFORNIA SCHOOLS**



To access the full report and case studies for each school, please visit: [nmefoundation.org/resources](https://nmefoundation.org/resources)

In many public and private schools serving affluent youth, students regularly make choices about their own learning, engage in active and authentic learning tasks, and receive support tailored to their needs. In these schools, the principles of student-centered learning are simply considered good practice. However, the same is not true for low-income youth and students from other underserved groups, who are far less likely to encounter the type of active, engaging, personalized classroom experiences that more privileged families take for granted. To help address this opportunity gap, the Stanford Center for Opportunity Policy in Education (SCOPE) undertook a study of four non-selective California high schools whose student-centered approaches are garnering strong results with low-income students of color.

#### **STUDY DESIGN**

The study focuses on four high-achieving urban schools in California, two that are part of the statewide Linked Learning initiative, which blends rigorous academics with workplace learning, and two that are members of the Envision Education charter school network, which emphasizes personalized learning and 21st century skills. Researchers compared short- and long-term student outcomes to similar students in the same districts and tracked the progress of graduates into their first years of college. They used interviews, observations, surveys, and a document review to capture the specific practices and conditions in each school that enable strong student outcomes.



#### **TRANSFORMING A COMMUNITY, ONE STUDENT AT A TIME**

Life Academy of Health and Bioscience, a small public high school in the Fruitvale neighborhood of East Oakland, was born out of a community movement for quality small schools. The small, non-selective school aims to interrupt patterns of injustice and inequity in Oakland through transformative learning experiences that equip students to succeed in college and medical careers.

The school's unique model includes: an inquiry approach to instruction, a four-year advisory program, interdisciplinary performance assessments, career internships for every 11th- and 12th-grade student, an array of interest-driven classes, and school-wide rituals, like the "fire walk" through which students prove themselves ready to advance to the 11th-grade. The curriculum culminates with the senior research paper, when students examine a question emerging from their internship experience and defend their findings to a panel of faculty, students, and community members.

Life Academy serves an exceptionally high-need student population—99% qualify for free or reduced-price lunch, and approximately 50% of students' parents did not complete high school—while boasting the highest percentage of graduates meeting the eligibility requirements for California's public universities in Oakland and the second highest enrollment rate in the state's public four-year university system. As the school's record of success has spread, it draws lottery applications from students across Oakland who seek a safe school environment and a "real chance" at attending college.

## Outstripping State and District Averages

	<b>CITY ARTS AND TECHNOLOGY HIGH SCHOOL</b>	<b>IMPACT ACADEMY OF ARTS AND TECHNOLOGY</b>	<b>DOZIER-LIBBEY MEDICAL HIGH SCHOOL</b>	<b>LIFE ACADEMY</b>					
LOCATION	SAN FRANCISCO	ANTIOCH	HAYWARD	OAKLAND					
SCHOOL TYPE	DISTRICT-APPROVED INDEPENDENT CHARTER, OPERATED BY ENVISION EDUCATION	DISTRICT SCHOOL PARTNERED WITH LINKED LEARNING	DISTRICT-APPROVED INDEPENDENT CHARTER, OPERATED BY ENVISION EDUCATION	DISTRICT SCHOOL PARTNERED WITH LINKED LEARNING					
STUDENT ENROLLMENT	397	639	462	338					
% FREE/REDUCED LUNCH	70%	48%	59%	99%					
% STUDENTS OF COLOR	92%	78%	90%	98%					
	<b>SCHOOL</b>	<b>DISTRICT</b>	<b>SCHOOL</b>	<b>DISTRICT</b>	<b>SCHOOL</b>	<b>DISTRICT</b>	<b>SCHOOL</b>	<b>DISTRICT</b>	<b>STATE</b>
2012 COHORT GRADUATION RATE	85%	82%	94%	74%	92%	71%	71%	59%	79%
% COMPLETING COURSES REQUIRED FOR UC/CSU ADMISSION	99%	56%	96%	24%	100%	44%	87%	51%	38%

UC/CSU STANDS FOR UNIVERSITY OF CALIFORNIA/CALIFORNIA STATE UNIVERSITY

### IMPRESSIVE OUTCOMES AT EACH STAGE

The students in the four schools—who are overwhelmingly low-income and majority black and Latino—significantly outperform peers in surrounding districts:

- Outpacing peers on state assessments:** Students in all four schools made greater gains on the California Star Test (English Language Arts) and California High School Exit Exams (ELA and math) than demographically similar students with equivalent baseline skills. The value added was even greater for students from low-income families and for those with parents who had not attended college.
- Graduating more students:** The schools' graduation rates significantly exceed their districts'; in three of the study schools, graduation rates also dramatically exceed the statewide average. This positive differential is especially large for English language learners and for low-income, African-American, and Latino subgroups.
- Preparing students for college entry:** The schools have greatly reduced the college preparation gap, with 87-100% of their students completing the full set of "a-g" courses required for admission into the California state college system. Statewide, only 38% of students meet this bar.
- Persisting in college:** In the two schools that have been operating longest and are therefore able to track student attainment beyond high school, the college persistence rates of alumni far exceed the national average, particularly for first-generation college goers; 97% of graduates from City Arts and Technology High School who enrolled in four-year colleges, and 69% of those from Life Academy, remained enrolled for a fourth year.



## PRACTICES THAT PROMOTE SUCCESS

The four schools vary in design and curricular focus, but researchers identified several crosscutting features that appear to contribute to student success in a high-need urban context.

- **Strong school vision:** Faculty and staff demonstrate an unrelenting belief that every student has the potential to achieve high academic standards and attend college. This belief informs every element of their work.
- **Focus on relationships:** Through formal structures like advisory and a school culture that emphasizes student voice and community connections, the staff make it their business to know each student well, build strong relationships, and celebrate success.
- **Rigorous, relevant, and engaging instruction:** The schools aim to prepare students who can excel in dynamic, information-rich environments through curricula that emphasize real-world connections, analytical thinking, inquiry, collaboration, communication, and student leadership and autonomy.
- **Mastery as the goal:** Every student is held to a high standard, with time and resources used flexibly to help them get there. Ongoing performance-based assessments help teachers and students track progress to mastery.
- **Substantial and differentiated supports:** The schools employ in-class and out-of-class strategies to build student confidence and motivation and to address low academic skills and other challenges related to poverty and language fluency.
- **Investment in staff capacity and leadership:** To nurture and sustain the student-centered practices at the heart of each school model, the leaders invest in: developing a shared vision, distributing leadership among staff, regular grade-level teacher collaboration, and opportunities for teachers to build instructional expertise and to reflect on practice.





## Conclusion

### EMERGING RESEARCH FOR A DEVELOPING FIELD

The studies presented here offer new evidence and insights about how student-centered practices contribute to deeper learning in secondary schools. *All three studies found benefits to student-centered learning, with some of the most positive outcomes for students traditionally underserved by schools.*

This small group of relatively short-term research projects is just the beginning of the work of building a body of literature that can tell us how student-centered learning works, when, and for whom. The strength of the findings varied considerably across these studies—not surprising, given the range of models investigated and methodologies used, including varied practices and different measures. Student-centered learning encompasses an array of classroom practices, implemented in many unique school and community contexts. What works in one setting will only carry over to the next if other key factors are in place, including adequate resources, supports, and quality of implementation.

The variety of measures used in these studies, while appropriate to the specific questions and outcomes being investigated, also mean that the results are not directly comparable. Each research team built on existing, validated instruments where possible and created new ones as necessary to capture outcomes like student engagement and deeper learning, which traditional achievement tests are not designed to measure.

Given the emerging state of the field, a lack of common definitions of practice and agreed-upon research methodologies is not surprising; similarly, conversations about which student outcomes might be most sensitive to student-centered approaches, which outcomes matter most in the long run, and how to best to measure them are far from settled.



## INSIGHTS AND CONSIDERATIONS FOR MOVING AHEAD

While the studies did not all cover the exact same territory, a few themes emerged that can be useful to others working to foster more student-centered approaches in K-12 schools.

- 1. Teachers who implemented a higher degree of student-centered practices had larger gains in student outcomes.** Rather than thinking about teachers (and schools and classrooms) as “student-centered” or “not student-centered,” this research suggests that there is a continuum of practice. Even teachers who consider themselves to be more traditional may use student-centered practices some of the time, and vice versa. We still have much to learn about the specific practices and the frequency of use that leads to the strongest outcomes.
- 2. School culture matters.** While a teacher’s own beliefs about educational approaches certainly affect their practice, educators are working within the context of a school’s culture, curriculum, policies, and the philosophy of the school and district leaders. These studies suggest that such contextual factors can influence the type and degree of student-centered teaching and learning that takes place in a school.
- 3. Teachers need support.** Implementing student-centered practices effectively requires a highly developed set of skills and understanding. To become an effective student-centered practitioner, teachers need:
  - Quality, ongoing professional development that includes access to examples of high-quality, student-centered learning in action.
  - Adequate time for collaboration, planning, and review of lessons and student work.
  - Curriculum, assessment, and instructional tools that support student-centered methods.
  - Human capital policies—including those guiding teacher preparation, induction, evaluation, and advancement—that recognize and promote student-centered practices.
- 4. We need clearer definitions and examples of student-centered practice across disciplines.** While some facets of student-centered learning can be applied across subject areas, the ways in which students learn best will vary according to the content at hand. As teachers and those who support them look for entry points for developing a more student-centered practice, they can benefit from more nuanced definitions and examples within their own subject areas.



This new body of research sponsored by the Nellie Mae Education Foundation represents an important step in understanding the impact of student-centered learning. The studies presented here build on decades of work in education, psychology, and other sciences, forging new territory with rigorous impact analyses and fine-grained illustrations of student-centered learning on the ground in schools. Across the three studies, student-centered learning shows promise as a way to engage and motivate young learners, deepen their interactions with academic content, and achieve the positive outcomes that pave the way to long-term success.

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## *About the Researchers*

### **STANFORD CENTER FOR OPPORTUNITY POLICY IN EDUCATION (SCOPE)**

The Stanford Center for Opportunity Policy in Education (SCOPE) was founded in 2008 to foster research, policy, and practice to advance high quality, equitable education systems in the United States and internationally. SCOPE engages faculty from across Stanford and from other universities to work on a shared agenda of research, policy analysis, educational practice, and dissemination of ideas. SCOPE is an affiliate of the Stanford University Graduate School of Education and the Center for Comparative Studies in Race and Ethnicity (CCSRE) at Stanford.

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### **EDUCATION CONNECTION**

EDUCATION CONNECTION is one of Connecticut's six Regional Service Centers, which works collaboratively with school districts to provide educational and related services. EDUCATION CONNECTION's mission is to promote the success of school districts and their communities. EDUCATION CONNECTION provides services and programs focused on early childhood, adults and community, teaching and learning, student services, and school services.



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