TEACHING AND LEARNING IN THE ERA OF THE COMMON CORE

APRIL 2012

AN INTRODUCTION TO THE PROJECT AND THE NINE RESEARCH PAPERS IN THE STUDENTS AT THE CENTER SERIES

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STUDENTS AT THE CENTER
TEACHING AND LEARNING IN THE ERA OF THE COMMON CORE
A JOBS FOR THE FUTURE PROJECT

Students at the Center synthesizes existing research on key components of student-centered approaches to learning. The papers that launch this project renew attention to the importance of engaging each student in acquiring the skills, knowledge, and expertise needed for success in college and a career. *Students at the Center* is supported generously by funds from the Nellie Mae Education Foundation.

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ACKNOWLEDGEMENTS

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INTRODUCTION

By Nancy Hoffman, Adria Steinberg, and Rebecca E. Wolfe

At a time when every student must acquire the skills, knowledge and expertise needed for 21st-century college and career success, the moment is right for a fresh and cross-disciplinary look at the possibilities offered by student-centered approaches to learning. As an educational reform, student-centered learning has much in common with other efforts to close achievement gaps and provide equitable access to a high-quality education, especially for underserved youth. Furthermore, student-centered approaches draw upon an evidence base amassed from a long tradition of innovative approaches to teaching and learning.

Student-centered approaches to learning also have distinctive elements based on the most up-to-date theory and research on how young people learn and what makes them eager to learn. Specifically, student-centered approaches embrace the student's experience as the starting point of education; determine progression upon mastery; significantly expand and reshape the role of the educator; and harness the full range of learning experiences at all times of the day, week, and year.

Neuroscience and developmental theory have converged to reveal that deep learning and content mastery occur within a framework of 4 "R's": relevance (to society and oneself), reflection (meta-cognitive strategies), relationships (collaborative or social learning), and reinforcement (application of learning). In keeping with these 4 R's, student-centered approaches shift the educational paradigm around time, place, curriculum, teacher roles, assessment, technology, and policy.

This paradigm shift occurs at a time when it is clear that there must be an unwavering commitment to ambitious learning standards geared to today's educational and economic challenges. It is also a moment when the technologies of learning and its assessments are changing in ways that make the school building only one venue where deep learning takes place and can be demonstrated.

THE CONTEXT FOR STUDENTS AT THE CENTER

Recent advances in research and theory coincide with a long-awaited moment in U.S. education: the agreement of 46 states to adopt Common Core State Standards. The standards were developed with the recognition that global socioeconomic imperatives, combined with the dizzying pace of technological innovation, create a new urgency to develop engaging and challenging ways to educate our nation's young people.

The Common Core does not specify particular pedagogical approaches; thus, current discussions in many districts and states focus on how best to prepare educators to implement the Common Core State Standards. The knowledge base being assembled through the *Students at the Center* project speaks directly to the level of intellectual engagement and social and emotional development that will be required if all students are to reach the promised outcomes of college and career readiness. Student-centered approaches align with emerging work both to attain the promise of the Common Core and to meet its demands.

We believe the papers written for *Students at the Center* will contribute to the efforts of states to prepare educators to engage adolescents in deeper learning. These efforts are central to realizing the promise of the Common Core State Standards, which states are now gearing up to implement.

Since the early 1990s, too frequently teaching and learning have taken a back seat to isolating and assessing a narrow band of skills and knowledge outcomes. Thus, what the *Students at the Center* researchers have found has implications for critical topics in education reform: teacher effectiveness and support; assessing how accountability systems are designed; and determining what degree of flexibility and autonomy districts and charter school networks should afford their schools.

While the Common Core maps backward from skills and knowledge to curriculum, the conversation must simultaneously address how students are to develop the required learning dispositions. Otherwise, as the last two decades would prove, the "instructional core"—that vital interconnection of teacher, student, and curriculum—drops off the agenda, and the learning environment, whether in school or out, remains a black box, leaving individual teachers to struggle alone, learning neither from one another nor with their students. Fortunately, the Common Core appears to be inspiring much needed attention to what makes for effective teaching and strong curricula—and, in turn, it is also stimulating the development and testing of technological tools that can aid teachers and students in personalizing learning and supporting higher achievement.

THE STORY THE PAPERS TELL

Despite the wide interest in and need for student-centered approaches to learning, educators have scant access to a comprehensive accounting of the key components of it. To build the knowledge base for the emerging field of student-centered learning, Jobs for the Future, a national nonprofit based in Boston, commissioned papers from nine teams of noted researchers, with funding from the Nellie Mae Education Foundation.

Together, the syntheses of research in the *Students at the Center* papers tell a story that is both hopeful and challenging. On the one hand, it is a story of how teachers and leaders are beating the odds with traditionally underserved students using student-centered approaches backed by recent advances in brain, cognitive science, and motivation research. On the other hand, the papers identify significant gaps to be addressed in what we know about student-centered approaches, particularly about how to spread such approaches beyond individual classrooms and schools.

When we look at connections across the papers and the flow of ideas and challenges expressed in each, the series spans three overarching areas—learning theory; applying student-centered approaches; and scaling up student-centered approaches to learning—to make an argument about how students learn best.

LEARNING THEORY

Two papers delve into areas that are basic to the construction of learning theory and hence have important implications for classroom practice. In *Mind, Brain, and Education*, Christina Hinton, Kurt W. Fischer, and Catherine Glennon synthesize research uncovering the plasticity of the brain and how learning experiences continually shape its physical architecture. Thus, students' abilities are always developing, and learning environments—positive and negative—influence that development. This paper is among the first to consider student-centered approaches to learning in light of the most recent findings in mind, brain, and education research.

Brain research connects emotion with learning. "Emotion acts as a rudder to guide learning," Hinton, Fischer, and Glennon write. Or put another way, "We feel, therefore we learn." As the authors explain, when the brain encounters an experience, it tags it as "either positive and worth approaching or as aversive and worth avoiding."

The prefrontal cortex is the seat of emotion and of executive functioning, which involves goal setting, selecting appropriate learning strategies, monitoring progress, and assessing outcomes. In other words, emotion and executive function are physically integrated in the brain. Teachers can take advantage of this connection by helping students develop positive attitudes toward setting goals, assessing progress, and regulating emotions.

The research that Eric Toshalis and Michael J. Nakkula review and comment on in *Motivation, Engagement, and Student Voice* supports these findings from brain research. Motivation to achieve is almost never a consistent, invariable state; like the brain, it is malleable. Motivation to try will be enhanced if students believe (or are taught to believe) that they can acquire new skills and improve on existing ones through focus and exertion.

Students will only engage in learning if they feel emotionally that they have a stake in the activity, that they have a voice in how it is conducted and an impact on how it concludes. What students learn has to make sense to them. The more educators give their students choice, control, challenge, and opportunities to collaborate, the more motivation and engagement are likely to rise. Without these elements, students are likely to be disconnected and alienated from learning.

APPLYING STUDENT-CENTERED APPROACHES

Four papers explore research on how schools are applying student-centered approaches to raise achievement levels and close achievement gaps. Until now, research on what teaching and learning actually look like in student-centered schools has been stunningly sparse. The six schools that Barbara Cervone and Kathleen Cushman profile in *Teachers at Work—Six Exemplars of Everyday Practice* demonstrate how excellent schools and teachers apply the lessons from brain and motivation research every day to serve low-income students in ways that help students connect emotionally while meeting high standards. In these schools, students are engaged in learning, and teachers are supporting students to undertake ever more complex challenges, become more autonomous in addressing those challenges, and expand their awareness of the connections of their own work to that of the larger world.

Teachers in these schools are similarly challenged: they are called upon to play multiple roles, from curriculum planner and classroom facilitator to advisor and community connector. The six school communities embrace teamwork, risk taking, reflection, and norms of trust and inclusiveness—among teachers, students, administrators, and families. They are intentional in ensuring that every student flourishes and achieves academically and socially. And in all but one of these schools, the predominant populations are low income, of color, English language learners, and have learning differences—populations that are too often on the wrong side of the achievement gap. Most students come from families where high school graduation is an ambition, and college completion a dream.

In recent decades, educators have looked deeply at achievement gaps in reading and math—and how to close them. The students meeting appropriate standards in these subjects in the schools profiled by Cervone and Cushman are the same populations whose failures in these much-tested subjects often appear to be intractable. Three papers focus specifically on student-centered approaches that support the reading and math engagement and achievement of black, Latino/a, and special needs students. While acknowledging that the struggles they portray are not unique, all three also explore what is missing in the practices of many schools and districts.

Outcomes are likely to improve if teachers start by understanding and building on the roles that reading, writing, and math play or could play in the lives of students and their communities. For example, historically, literacy served the African-American community as a tool of liberation—"personal development, racial uplift, economic power, and political enfranchisement." According to *Literacy Practices for African-American Male Adolescents*, by Alfred W. Tatum, this historical perspective, with its underlying notion that literacy is about survival, growth, and protection of individuals and their communities, can serve as a productive starting point for conceptualizing quality teaching practices, selecting texts, and structuring instructional contexts.

Similarly, forms of mathematics privileged in schools are not the only mathematics that people use, write Rochelle Gutierrez and Sonya E. Irving in *Latino/a and Black Students and Mathematics*. Adolescents learn mathematics from people in their communities and use mathematics in ways that makes sense to them—not just to display knowledge to others (and get good grades) as happens in school, but to accomplish tasks in everyday life. A student-centered approach to mathematics would make use of the wide variety of mathematical practices and competencies that school mathematics generally misses. And it attends to the voices of learners themselves—what meaning they place on mathematics and mathematical learning.

Learning differences are as rich, dynamic, and complex as the neurological differences that underlie them. These insights, David H. Rose and Jenna W. Gravel suggest, require a radical rethinking of curricula. As they write in *Curricular Opportunities in the Digital Age*, discussions of a curriculum typically focus on the needs of a mythical "average" learner, but now curriculum and pedagogy must be as articulated and differentiated as the learners themselves. Advances in the design of multimedia learning technologies provide a new and promising foundation for the realization of student-centered learning. Curriculum and technology adjustments for students with sensory and physical disabilities—even students with dyslexia—are known as striking cases. The authors go beyond these examples to point to the need and growing opportunity to "customize" a curriculum so that it is student centered enough to be effective for a wide variety of learners.

SCALING UP STUDENT-CENTERED APPROACHES TO LEARNING

Three papers pick up where the others leave off: meeting the enormous challenge of implementing optimal conditions for learning across schools, districts, and networks of schools. In general, while almost every community has one or more schools in which students thrive, these schools serve far too few young people.

There are multiple ways to summarize the lessons from the preceding papers in ways that can apply to schools and systems. A current term that is used to translate many of the findings to successful practices around which schools can organize is "personalization." In *Personalization in Schools*, Susan Yonezawa, Larry McClure, and Makeba Jones use personalization to refer to the web of positive relationships, cultivated among adults and young people in classrooms, schools, and communities, that promotes learning by helping students feel competent in and connected to the world. In personalized learning environments, educators use insights about student abilities, learning styles, interests, and motivations to design effective, individualized instruction and guidance. They pay attention to and liberate student voice.

Despite much hard work, efforts to personalize learning across schools often fall short of their potential to make a significant difference in the lives of young people because individual teachers are acting alone. Whether in small schools or larger ones, teachers together with school leaders must strive to develop effective educational experiences that include personalized structures, instruction, and relationships. Schools that do so can harness the power of technology; help students see the links between learning and future careers; re-imagine mastery learning; and engage students with their communities. Only by paying attention to this kind of personalization will educators help every student become a purposeful learner and see a "manifestation in practice" of learning theory.

In *Assessing Learning*, Heidi Andrade, Kristen Huff, and Georgia Brooke address an additional challenge to scaling up student-centered approaches. While small-scale formative assessment is individualized—focused on learning and growth and amenable to actively engaging students in the regulation of their own learning—larger-scale assessments used today often appear to be irrelevant to what students and teachers feel it is important to learn or appear to trivialize learning. In contrast, schools and districts across the nation are reporting impressive gains in student achievement through the use of teacher-created, criterion-referenced assessments, which are developed by teams of teachers, from within and across schools, who collaboratively develop items that directly measure the curriculum enacted in their classrooms. A variety of classroom-based assessments are associated with significant gains in student learning and achievement, including self- and peer assessments, portfolios, assessment technologies, and formative uses of summative tests.

Because no one assessment process can inform approaches to learning and instruction, as well as decisions at the school, district, and policy levels, Andrade, Huff, and Brooke conclude that student-centered assessment should be part of a balanced system of formative, interim, and summative assessments. Recent advances suggest that large-scale tests can also provide valuable feedback to students, teachers, and others, particularly when tests are sensitive to the students' context, based on theories of learning, and provide instructionally relevant score reports. Only then can assessment enable teachers to respond to the learning needs of each student quickly, frequently, flexibly, and appropriately. With new large-scale assessment systems drawing on these principles in the early stages of development, the jury remains out about whether such a balanced system is achievable, but it is certainly an aspiration.

Finally, in relation to scale, the most significant challenge Ben Levin, Amanda Datnow, and Nathalie Carrier identify in *Changing School District Practices* is that few districts appear to be deeply involved in implementing student-centered practices. Even research about higher-performing urban districts provides little evidence that they are using such practices across all their schools. System-wide implementation of student-centered approaches presents particular problems because it aims to change longstanding traditions of teacher practice and classroom culture, and it may clash with policy and administrative requirements and state accountability measures. Most examples of district engagement involve the creation of programs tailored to serve particular groups of students, rather than system-wide reforms intended for all of a system's students. A strong, districtwide, student-centered agenda would likely not only implement special programs and/or schools but also work simultaneously to change practice in all schools and for all students.

METHODOLOGY: THE DESIGN OF STUDENTS AT THE CENTER

With an aim of reaching practitioners, policymakers, and researchers, *Students at the Center* has three goals:

> Synthesize what is known from research about the dimensions and impact of student-centered approaches to learning in the secondary setting, thus laying the groundwork for building a field;

> Look at learning and teaching from the student perspective, thus placing the proper emphasis on what is required for student motivation, engagement, and self-regulation; and

> Delineate the factors that enable or hamper bringing student-centered learning to scale across districts, systems, and networks of schools, thus contributing to the cross-sector conversation on how we create an education system that will enable each student to achieve college and career success.

The project began with a complex challenge: deciding what topics might constitute the foundation of student-centered learning, even as the Nellie Mae Education Foundation and Jobs for the Future were formulating a draft definition of student-centered approaches. Such a challenge characterizes exercises in field-building: if the components were delineated and the definition clear, the field would already be built (*see box on field-building*.) The JFF team arrived at the final set of topics after wide consultation with expert researchers, practitioners, and foundation leaders—a number of whom serve on the *Students at the Center* advisory committee. In some cases topics of interest were too new to have a research base that could be synthesized. For example, we crossed off a number of the interesting questions in regard to the explosion of technological tools to personalize learning, as well as critical questions on financing student-centered approaches. In only one case did we commission original field research—the portraits of entire schools where student-centered teaching is exemplified.

WHAT WE MEAN BY FIELD-BUILDING

A field is "a community of organizations and individuals working together toward a common goal, and using a set of common approaches to achieving that goal," as defined by the Bridgespan Group, a nonprofit advisor and resource for mission-driven organizations and philanthropists.* A key requirement of a field is a knowledge base that creates a shared identity and language.

Despite the significant history of approaches and movements that could be considered student centered (e.g., Dewey's Progressive Education, Freire's Liberation Education, the small-schools movement, deeper learning), a panoply of terms and a dearth of evidence-based models (especially those at scale) characterize student-centered approaches. As initial steps in field-building, *Students at the Center* embraces the tasks of defining core elements of student-centered learning and synthesizing existing research that lays the ground for understanding what is already known about these approaches and what further research is necessary.

* See: http://www.bridgespan.org/strong-field-framework.aspx

Because of the project's field-defining goal, JFF did not simply identify writers and sign them on to write. The research teams committed to becoming a "learning community," and they outlined, refined, and revised their papers in deep, engaged conversation with one another. Along with participating in regular phone calls before and during the writing process, the writers came together in three face-to-face sessions: during the kick off of the project when only paragraphs and outlines of the papers existed; when the papers were nearing final form to participate in outlining the introduction to the collection; and a third time as the presenters and centerpieces of a conference in April 2012 with the title of this collection. In preparation for the conference, papers were paired to raise key questions such as: How can district policies support systemic implementation of personalization that result in a more consistent commitment to student-centered approaches to learning?

This project also took shape within the broader agenda of the Nellie Mae Education Foundation: to embrace student-centered approaches while recognizing the importance of the Common Core as a body of knowledge and skills that thoughtful adults have agreed that young people need to compete in the 21st century. In 2006, with a new president in place, the foundation began examining the New England economy and assessing the needs of the region's youth. From this initial work, it concluded that despite many experiments to insert student needs and voice into education reforms, no one had examined or compiled a coherent body of research to assess whether these developments could be both justified and better informed by emerging developments in teaching and learning.

Determining and shaping the papers was done with an eye to what the research and education community needed to better understand in order to build the field. Each of the research topics was selected to foster a deeper, more cohesive, research-based understanding of one or more of the core student-centered elements and goals, as well as to demonstrate their interconnections.

With that in mind, JFF asked the authors to:

> Synthesize and analyze existing research in their areas;

> Identify what is known and where gaps remain related to student-centered approaches to learning; and

> Discuss implications, opportunities, and challenges for education stakeholders who put students at the center.

We asked them to consider the project's definition of student-centered approaches, but we also encouraged them to add, subtract, or critique it as they wished. Thus, each paper approaches the idea from a different angle and wrestles with the concept in some manner.

The researchers, selected for their expertise in a particular area, had wide berth to determine how to approach their topics. With field-building in mind, as well as considerations of what it will take to embed student-centered approaches to learning in the mainstream of education, additional author guidance included encouragement to:

> Examine interdisciplinary research and research that might fall outside of the academy standards that still meets a high bar of rigor;

> Pay particular attention to underserved youth, although not to the exclusion of relevant research and practice on broader populations;

> Focus on research that pertained to secondary education; and

> Write with a broad audience of education stakeholders in mind, including other researchers, practitioners in leadership positions, and policymakers.

WHAT WE MEAN BY RESEARCH

The writers in *Students at the Center* approach their analysis and writing with a common understanding of the term "research." Of course, it includes peer-reviewed journal research or scholarly books, but the writers also used their judgment about including evaluations, policy reports, journalism, and even websites. Peer-reviewed research is the core of each paper in fields like motivation or mind, brain, and education. However, no body of traditional research directly addresses the relation of some topics to student-centered learning, so other papers combine several literatures. For example, while there is literature on adolescent literacy and on black male achievement, Alfred Tatum looks across these separate domains and applies them to the topic of black males and reading.

In writing about personalization, Susan Yonezawa, Larry McClure, and Makeba Jones face a different challenge. While "personalization" is a staple concept in accounts of small schools and in discussions of digital learning, no field called personalization shows up in the literature. However, researchers have devoted themselves to understanding the teacher-student connection, and especially what characterizes positive relationships between young people and their teachers. As a result, their paper first defines personalization, then looks at the literature on relationships through this lens.

In a final example, when Ben Levin, Amanda Datnow, and Nathalie Carrier looked at the extensive literature on high-performing districts and charter management organizations, they found little evidence of student-centered practices at scale. Hence, they document an absence, and, like several other teams, pose and begin to answer the "what would it take" question in regard to student-centered learning.

WHAT'S NEXT FOR STUDENTS AT THE CENTER

The last 100 years of school reform are punctuated by the ideas of revolutionary thinkers who share the premise that learners engage when learning builds from their needs, resources, and interests. What John Dewey, Lev Vygotsky, Ivan Illich, A.S. Neill, and Paulo Freire, as well as more recent thinkers like Theodore Sizer, Deborah Meier, Maxine Greene, and Nell Noddings, have in common is the perspective that learning is constructed through young people's discovery and self-discovery. The compelling student-centered arguments of such thinkers have resulted in whole-school experiments (e.g., University of Chicago Lab School, Summerhill, Central Park East, the MET, and private progressive schools serving students with means). And some of these thinkers' student-centered learning strategies and perspectives have been incorporated into mainstream approaches to education reform (e.g., the National Writing Project, WestEd's Strategic Literacy, Readers and Writers' Workshop, and inquiry-based science curricula).

That said, student-centered approaches have waxed and waned. They waxed in the Progressive Era, the free schools of the 1960s, and aspects of the School to Work movement. The waning happened for several reasons—for example, signs that the student-centered approach as implemented was inadequate in closing the achievement gap and a lack of accountability for results during periods when the theory was "let a hundred flowers bloom."

However, the interest today in student-centered approaches is not simply another swing of the pendulum. Our opportunity—and challenge—is to bring the power of student-centered approaches back to the foreground while taking advantage of advances in educational theory and practice and learning methods and technologies. In the face of continuing failures to raise U.S. educational achievement and education attainment levels significantly, and the inability to close persistent race and income gaps, educational thinkers and activists are returning to the power of harnessing what is known about how students learn and what engages them in learning with energy, curiosity, and joy.

Key challenges at this early moment in building the field of student-centered learning are to be clear about its defining elements and to understand in a systematic and actionable way what basis exists in careful research for claims about the power, effectiveness, and value of these elements as a holistic framework.

Students at the Center is a work in progress; the publication of the nine papers is Phase I of the ongoing field-building project. While still under discussion, Phase II is likely to supplement the website with ancillary materials, commission additional papers either to fill identified gaps or to further exploit the interconnections between papers to demonstrate how key elements taken together might influence practice. For example, as Hinton, Fischer, and Glennon note, substantially more research is needed on the impact of toxic stress on the brain, and as is painfully obvious, scaling practices identified in the papers on reading and math across whole schools let alone districts remains a daunting challenge.

With these nine papers as a foundation, *Students at the Center* has captured a good deal of what research and practice tell us about key aspects of student-centered approaches to learning at this moment—and about the challenges of implementation and accountability for results when posed as a solution or agenda for an enormous mass education system. The portrait here is of an education system in many ways still in the 20th century even while a 22nd-century education universe is being invented around it. No one yet knows the impact of the exponential increase in technology platforms and applications designed to both personalize instruction and make it more powerful and cost effective. None of these platforms or application has been implemented at a large scale, and it will be some time before research evidence will be broad and deep enough to give a reliable indication of impact. But as experimentation and improvement go forward in multiple modes, it is essential for all educators to have a baseline of understanding how young people learn best.

ABOUT THE AUTHORS

Nancy Hoffman, Ph.D., vice president and senior advisor at JFF, works on state policy, higher education, and transitions to postsecondary education. She has edited two JFF books: *Double the Numbers: Increasing Postsecondary Credentials for Underrepresented Youth*; and *Minding the Gap: Why Integrating High School with College Makes Sense and How to Do It*. Dr. Hoffman is a consultant for the Organization for Economic Cooperation and Development (OECD). Her most recent book, *Schooling in the Workplace: How Six of the World's Best Vocational Education Systems Prepare Young People for Jobs and Life*, is based on that work. She serves on the Massachusetts Board of Higher Education. (All three books are published by Harvard Education Press.)

Adria Steinberg, Ed.M., vice president at JFF, leads its program and policy efforts to improve educational options of young people disengaged or disconnected altogether from the educational system. Ms. Steinberg and her Pathways Through Postsecondary team work with policymakers to improve graduation rates and support states and districts to create and scale up high-quality pathways for disconnected youth. She is the author or coauthor of *Pathway to Recovery: Implementing a Back on Track Through College Model*; and *Reinventing Alternative Education: An Assessment of Current State Policy and How to Improve It*.

Rebecca E. Wolfe, Ph.D., the *Students at the Center* project director, is a senior program manager on JFF's Pathways Through Postsecondary team, which is focused on improving the educational options and prospects of young people who have disengaged or disconnected altogether from the educational system. She works with local and state leaders to create and scale up high-quality educational pathways that lead to college and career success. She is the coauthor of *Back on Track to College: A Texas School District Leverages State Policy to Put Dropouts on the Path to Success*.

MIND, BRAIN, AND EDUCATION

By Christina Hinton, Kurt W. Fischer, and Catherine Glennon

EXECUTIVE SUMMARY
THE EDITORS, *STUDENTS AT THE CENTER* SERIES

Recent technological breakthroughs make research in human biology and cognitive science more relevant for education than ever before. With powerful brain imaging tools, neuroscientists can for the first time study the learning brain in action. New technologies in genetics are revealing the complex interactions between a learner's genetic makeup and the external environment, while cognitive scientists are tracking the development of alternative learning pathways. Such advancements have led to the emergence of the field of mind, brain, and education. Christina Hinton, Kurt W. Fischer, and Catherine Glennon consider student-centered approaches to learning in light of important findings from this trans-disciplinary field. The authors suggest that such approaches support learning in the brain, giving them the potential to support academic achievement and close achievement gaps, particularly for underserved youth. Ultimately, student-centered programming could lead to a more effective and equitable education system for all students.

The authors point to a number of significant implications of findings about the brain for student-centered approaches to learning (*see table*).

FINDINGS ABOUT THE BRAIN	IMPLICATION FOR STUDENT-CENTERED APPROACHES TO LEARNING
The brain is continually changing, as learning experiences shape its architecture; students' abilities are always developing.	Student-centered approaches to learning use a variety of ongoing assessments to monitor learning and tailor instruction to promote learning.
The brain is learning virtually all the time, in both formal and informal contexts.	Student-centered approaches can capitalize on this through a range of nontraditional learning experiences, such as afterschool enrichment, internships, and community programs.
The brain changes that underlie learning occur when experiences are active, not passive.	Student-centered approaches empower students to engage in active learning experiences that are relevant to their lives and goals.
Learning and emotion work together in the brain.	Student-centered approaches address emotion's central role in education by nurturing positive relationships, teaching emotional regulation skills, and providing shelter from harmful stresses.
Each student has a complex profile of strengths and limitations and learns best through experiences tailored to his or her needs and interests.	Student-centered approaches customize instruction in each subject to each individual.
Underserved students, including low-income youth and English language learners, sometimes thrive with different instructional techniques than their middle-class peers.	Student-centered approaches have the flexibility to focus on their particular needs.

DIVERSE, ONGOING ASSESSMENTS

Arguably the most important insight for education from the field of neuroscience is that the brain is highly adaptive, a property called plasticity. As a result of experiences in different environments, students' brains change continuously, from preschool through high school and beyond. Students learn not only at school but also at home, at work, in community centers, and in other settings.

As students engage in various activities—from mastering reading to playing online chess to practicing word processing—these experiences gradually sculpt the physical architecture of their brains. The brain is made up of networks of interconnecting nerve cells, called neurons, and supportive glial cells, which nourish the neurons. Learning experiences are translated into electrical and chemical signals, which cascade among many neurons in many areas of the brain. Gradually, the signals modify connections among neurons in certain areas of the brain and those areas are reorganized. Over time, the connections are affected in a "use it or lose it" way: the ones used the most are strengthened, while the less active are weakened or eliminated.

A significant body of research now contradicts the longstanding notion that individual abilities are fixed at birth. Indeed, the brain's plasticity means that individual abilities develop continuously. The more a student learns in a particular area, the more intelligent the brain becomes in that area.

The brain's adaptability also helps students overcome many learning challenges, as alternative pathways develop to compensate for biological limitations. For example, students with dyslexia, a reading difficulty typically involving impaired phonological processing, often can develop alternative neural circuitry to support reading if they receive appropriate instruction.

The continually changing nature of the brain underscores the potentially negative effects of certain traditional educational practices, such as tracking. Sorting students into rigid tracks based on their current levels of ability could deny lower-tracked students the rich learning experiences their brains need to reach their full potential. By contrast, a central aspect of student-centered approaches to learning— flexible and meaningful learning experiences provided with ongoing guidance—can enable students at all levels to build toward mastery of a common set of core skills.

A powerful tool for guiding each student toward mastery is formative assessment, which plays an integral role in student-centered approaches to learning. It involves frequent, ongoing assessments using a variety of methods, ranging from examining work samples, to monitoring classroom discussions for signs of understanding, to checking in with individual students about the lesson. This constant stream of feedback helps educators tailor instruction, sometimes within moments, to meet each student's immediate needs. It also helps students gain a sense of their strengths and weaknesses, which can inform their continued efforts to learn.

A VARIETY OF NONTRADITIONAL LEARNING EXPERIENCES

Research on brain plasticity indicates that the brain is learning virtually all the time, in both formal and informal contexts. Traditional schooling, where a teacher stands in front of a classroom and delivers content through lecturing, is only one of many potential learning experiences. Student-centered approaches to learning value a variety of student-driven activities, both within the classroom and in other school spaces. Nor is learning restricted to the confines of the school building or the typical school day. The idea of "anywhere, anytime" learning is central: education can occur far beyond a school's walls, at any hour, on any day.

Student-centered approaches encourage a wide range of nontraditional learning experiences, such as afterschool enrichment, internships, and community programs. Learning can occur in settings ranging from local businesses to community centers to cyberspace. Educators can include teachers, professionals, parents, and community members. With a student-centered approach to learning, these are not just "extracurricular" activities. Schools would formally recognize them—and award credit for them—provided that students are working toward core skills and can demonstrate their proficiency in them.

LEARNING THROUGH ACTIVE, RELEVANT EXPERIENCES

Neuroscience research shows that the brain's active engagement is a prerequisite for learning. Changes in the brain's neuronal connections that underlie learning occur only when experiences are active; passive activities do not affect the brain the same way. In educational terms, this suggests that sitting in a classroom listening to a lecture will not necessarily lead to learning.

Student-centered approaches empower students to engage in active learning experiences that are relevant to their lives and goals, both inside and outside the classroom. Brain research is consistent with the student-centered principle of giving credit for mastery of core skills in formal and informal contexts, rather than awarding credit just for spending time in a classroom.

POSITIVE RELATIONSHIPS AND EXPERIENCES

Learning and emotion are integrated in the brain. In fact, strong skills in emotional regulation strongly predict academic achievement. Emotion acts as a rudder to guide learning. The emotions students feel during an experience become salient labels that steer future learning and decision making. People gravitate toward situations they have tagged positive and away from situations they have tagged negative or worth avoiding.

Neuroscience research shows that emotion and learning are integrated in the brain. This research settles longstanding ideological debates about whether educators should be responsible for emotional development because if educators are involved in intellectual development, they are inherently involved in emotional development. Students are still developing emotional skills and learning to regulate their emotions in childhood and adolescence. Education can support the development of emotional regulation skills. Indeed, this should be a priority, given their critical role in academic performance.

Students are more likely to thrive academically when educators provide a positive learning environment, nurture teacher-student relationships, encourage a sense of community, teach emotional regulation strategies, and provide shelter from toxic stress. Student-centered learning approaches recognize the importance of emotion, calling for a supportive community of educators that can help reduce student stress and apply a knowledge of individual differences in motivation to engage each student.

Emotion is also physically integrated in the brain with executive functioning, a set of mental processes that are critical to learning. Executive function skills connect past experience with present action and include planning, selecting learning strategies, and assessing outcomes. The brain's prefrontal cortex, which regulates executive functioning and some emotional processing, is maturing during adolescence and into early adulthood. It is important for educators to support this development.

Student-centered approaches to learning require students to be self-directed and responsible for their own learning, including goal setting, planning, and monitoring progress. Student-centered approaches teach students the necessary executive function skills to do these tasks, initially offering significant support, then gradually removing it as students become more self directed.

CUSTOMIZED INSTRUCTION TO ADDRESS DIFFERENCES

Mind, brain, and education research on individual differences contradicts the simplistic notion that each student is either intelligent or not. It points to a more nuanced perspective that recognizes that each student has a complex profile of strengths and limitations. A student may struggle in one area, such as mathematics, yet thrive in another, such as linguistic ability or interpersonal intelligence. Even within single domains, students can have both strengths and weaknesses.

The wide range of individual differences result from an interaction of each student's genetic tendencies and experiences. Experiences can reinforce or counteract genetic inclinations. This explains, for example, why someone born with a genetic predisposition for shyness can grow into a gregarious person.

Mind, brain, and education research on individual differences, language learning, literacy, and mathematics suggests that students can follow different learning pathways to master the same core skills. Each individual learns most effectively through experiences tailored to his or her needs and interests. Traditional instruction and standard curriculum most often do not accommodate individual differences. Uniform approaches lose a host of students because they fail to take into account their different ways of learning—or the different languages, cultures, values, goals, and interests they bring to school. Adjusting instruction to meet each student's particular needs often can move students from failure to proficiency.

Without such instructional flexibility, difficulties in a certain domain may unnecessarily interfere with learning in another. For example, students with limited English proficiency in a traditional math class would struggle to access knowledge from a typical textbook or demonstrate their understanding on a written test. However, if given alternatives, such as a computer program that can translate English instructions into their native language, they would be far less likely to fall behind in math while their language skills were developing.

A FOCUS ON THE NEEDS OF UNDERSERVED STUDENTS

While all students can benefit from student-centered approaches to learning, it is important to note how underserved students in particular may thrive with different instructional techniques than their middle-class peers. For example, neuroscience research on literacy shows that English language learners use a somewhat different brain network for reading than native English readers, because

of differences between the rules of English and other languages. This suggests that ELL students may require alternative means of reading instruction. Many of the practices associated with student-centered learning provide a flexible framework for education that can accommodate these types of individual differences through differentiated instruction.

Neuroscience research also indicates that there are sensitive periods early in life for learning certain aspects of language, including grammar and accent. Students who receive non-native language instruction in preschool or primary school have a biological advantage for mastering those aspects of the language. Since proficiency in the language of instruction strongly predicts academic achievement among immigrants, teaching ELL students English as early as possible, with complementary instruction in their native tongue, gives them a critical advantage for learning the language and, ultimately, academics.

Recent research highlights a key difference between disadvantaged students who succeed in school and those who do not: their emotional skills. Resilient disadvantaged students tend to have more self-confidence and higher motivation than non-resilient peers. Therefore, using an educational approach that nurtures emotional development is especially important for underserved students. As noted, student-centered approaches pay particular attention to emotional development and motivation.

Sheltering students from major stresses is important to these efforts. Research suggests that students from disadvantaged backgrounds are more likely to experience toxic stressors—poverty, abuse, bullying, trauma—but receive little support in dealing with them. Toxic stress can disrupt brain circuitry and cause learning problems. It also can change an individual's stress system such that situations that might not threaten most students can trigger a stress response, which can interrupt learning and manifest in problematic aggressive attitudes that damage students' relationships with teachers and peers.

Fortunately, supportive school environments can buffer students' brains from the impacts of unhealthy levels of stress. Recent research on students of low- and middle-socioeconomic status reveal that low-SES students typically come to school with higher levels of the stress hormone cortisol. However, when students from disadvantaged backgrounds are in high-quality schools, their cortisol levels decrease during the day. The better the school, the greater the drop. This suggests that a quality learning environment can lead to better emotional regulation and more favorable learning outcomes. This research underscores the need for child-friendly learning spaces that promote students' intellectual, emotional, and physical well-being both during and outside of regular school hours.

ABOUT THE AUTHORS

Christina Hinton, Ed.D., works on issues at the nexus of neuroscience and education at Harvard Graduate School of Education. Her recent research focuses on the biological basis of empathy and education for a cosmopolitan ethic of care. She has authored many articles and book chapters on educational neuroscience, and lectures internationally on implications of neuroscience research for education, research schools, and education for global awareness.

Kurt W. Fischer, Ph.D., Charles Bigelow Professor of Education and the director of the Mind, Brain, and Education Program at the Harvard Graduate School of Education, studies cognitive and emotional development and learning from birth through adulthood, combining analysis of the commonalities across people with the diversity of pathways of learning and development. He is the author of "Dynamic Development of Action, Thought, and Emotion" in the *Handbook of Child Psychology* (Volume 1); *Human Behavior and the Developing Brain; Mind, Brain, and Education in Reading Disorders*; and a dozen other books, as well as over 200 scientific articles.

Catherine Glennon, Ed.M, earned a Master's degree from the Mind, Brain, and Education program at the Harvard Graduate School of Education. She is a cognitive development research specialist at HGSE, researching developmental pathways of perspective taking, complex reasoning, and student engagement.
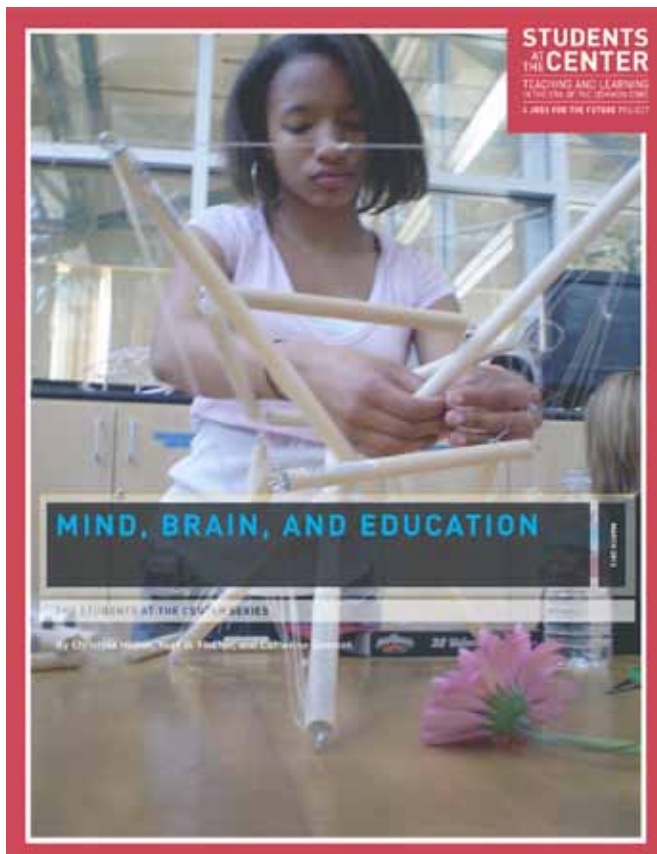
Mind, Brain, and Education

Recent brain and cognitive science research makes it possible to study the learning brain in action and track the development of learning pathways. This paper considers student-centered approaches in light of this research.

To download the full paper, go to www.studentsatthecenter.org

MOTIVATION, ENGAGEMENT, AND STUDENT VOICE

By Eric Toshalis and Michael J. Nakkula

EXECUTIVE SUMMARY
THE EDITORS, *STUDENTS AT THE CENTER* SERIES

Spend time in secondary school classrooms, and you are likely to realize that teachers work exceptionally hard to convince their students that the day's lessons are worthy of their attention and effort. Using strategies ranging from inspiration to coercion, teachers are forever attempting to persuade students to participate meaningfully in class activities and to motivate them to achieve. When these techniques succeed, classrooms come alive with exploration, discovery, and learning. When they fall short, young people tune out, disengage, and, ultimately, fail.

Figuring out what motivates individual students and engages them in school is as essential as it is challenging. Indeed, it is the prerequisite for implementing student-centered approaches to learning. However, today's teachers—confronting large class sizes, fast-paced academic calendars, and standardized assessments—face particular pressures to lump all students together and "teach to the middle." To help educators understand how to engage and motivate each individual in a large, diverse group of teenagers, Eric Toshalis and Michael Nakkula review research on achievement motivation, school engagement, and student voice and highlight what works. They conclude that fostering student voice—empowering youth to express their opinions and influence their educational experiences so that they feel they have a stake in the outcomes—is one of the most powerful tools schools have to increase learning.

Toshalis and Nakkula observe that:

> To capitalize on individual motivations and meet individual needs, customized pedagogical approaches that differentiate instruction for each student tend to work far better than uniform "catch-all" techniques.

> Research shows that both intelligence and motivation are malleable. Helping students understand that they can acquire new skills and improve existing skills through effort, regardless of past achievement, increases their motivation to try.

> Tracking students based on perceived intelligence or motivation can be harmful. Separating "less intelligent" or "unmotivated" youth from their higher-achieving peers will likely exacerbate existing motivational dispositions and intellectual capacities.

> Providing opportunities for choice, control, and collaboration are potent strategies for increasing academic achievement. Young people are likely to be more motivated and engaged in an activity when they feel they have a voice in how it is conducted and can affect how it concludes.

> Many students have difficulty engaging in school, even when they feel motivated. For these students, it may be necessary to teach self-regulation skills to help them stay on task, set goals, monitor their learning, and change strategies as needed.

> Despite the benefits of technology, today's myriad digital distractions can threaten productivity and cognitive complexity in learning. It is essential to teach adolescents when to unplug and how to focus on one activity at a time.

In this era of standardization and the Common Core, the practice of elevating student voice may be as countercultural as it is commonsensical. In short, the authors remind us that the system exists for the students, not the other way around.

MOTIVATION AND CUSTOMIZATION

Decades of research show that achievement and motivation are inextricably linked. However, no single motivational pathway or type of engagement guarantees academic achievement. Each student is a unique blend of individual interests, backgrounds, stories, and needs. Each is motivated in different ways at different times. Rewards and punishments may encourage some youth to increase their effort, while greater autonomy or more peer interaction

may be more effective with others. To meet the challenge of reaching every student in today's diverse classrooms, customized teaching approaches that differentiate instruction tend to work far better than one-size-fits-all techniques.

Research supports a nuanced understanding of motivation: Students exist within a dynamic ecology; it shapes them, while they also shape it. Knowing each student well enough to see how this web of causality motivates him or her to achieve is crucial to teaching that student well. At their core, this is what student-centered approaches to learning are all about.

Some students enter school motivated and ready to learn, but many do not. Educators need to understand what they can about the different social, economic, and cultural contexts of their students and how these influence their efforts in the classroom. Moreover, it is beneficial to view these differences not as impediments to overcome but as resources that can enhance learning. Effective student-centered approaches use adolescents' personal experiences as hooks to help them connect with the curriculum.

EFFORT MATTERS MOST

Contrary to long-held views, intelligence is not a fixed trait, strictly the result of one's genetic makeup. After decades of debate, researchers now largely agree that individuals may differ in their biological aptitude for learning certain kinds of things, such as music or social skills, but functional intelligence is for the most part malleable and learnable, and therefore teachable. In other words, a student's intelligence—and achievement—can change. The most important factor, according to research, is a person's level of effort. And it is the individual's level of motivation that determines the intensity of the effort.

A multitude of studies demonstrates that motivation is malleable, too. In an interesting twist, it turns out that people's beliefs about the nature of intelligence can significantly affect their motivation. For example, those who believe that people are born either smart or not are more likely to give up when facing academic difficulty: they tend to think they just lack the intelligence to solve the problem. But students who believe that effort alone can make a positive difference are more likely to persist and succeed.

The importance of these findings for student-centered approaches to learning cannot be understated. Regardless of past achievement, if students believe (or are taught to believe) that they can acquire new skills and improve existing skills through focus and exertion, their motivation

to try will grow. Therefore, it is essential to help students learn to associate their achievement with their effort, which they can control, rather than with an innate ability they simply may or may not possess.

For educators implementing student-centered approaches to learning, this means that praising a student's intelligence can do more harm than good. It is far better to instill and reinforce the belief that persistence will increase proficiency. Accordingly, praise is most effective when it is specific to a skill or talent the student is developing, such as, "Your writing has really improved, Maria. I can see your hard work paying off here."

TRACKING DECREASES MOTIVATION

Misunderstandings about intelligence and motivation—and the mislabeling of students these produce—may actually contribute to today's troubling achievement gaps. Their changeable nature highlights a key point for educators: neither intelligence nor motivation should be used as categories to sort or track students in school. Grouping the so-called "unmotivated students" together and sequestering them from the supposedly "motivated students" is likely to exacerbate existing motivational dispositions and intellectual capacities.

Research suggests that it is a combination of academic challenge and social support that leads to substantial increases in learning. Motivating students to apply themselves in the classroom requires knowing them, their beliefs, their anxieties, and their backgrounds—and customizing approaches that are responsive to each. It does not require "dumbing things down," a common feature of lower-tracked classes.

A more research-driven and student-centered approach would be to push all young people toward incremental growth in their knowledge and skills, and to ascertain what motivates each individual student to achieve in a particular class. Teachers can then enlist the student's help in identifying factors that might elevate his or her motivation, including changes to the classroom and curriculum or changes to the individual's beliefs and behaviors.

STUDENT VOICE

One of the most powerful tools available to influence academic achievement is helping students feel they have a stake in their learning. To feel motivated to do something and become engaged in its activity, youth (like adults) generally need to feel they have a voice in how it is conducted and an impact on how it concludes. Time and

again, research has shown that the more educators give their students choice, control, challenge, and opportunities for collaboration, the more their motivation and engagement are likely to rise.

It is particularly important for adolescents, who are developing their sense of identity and their ability for complex thinking, to have the chance to affect decision making. Research shows that increasing levels of self-determination give rise to greater integration of the students' own sense of purpose, interest, and desire with what may be required of them from outside forces.
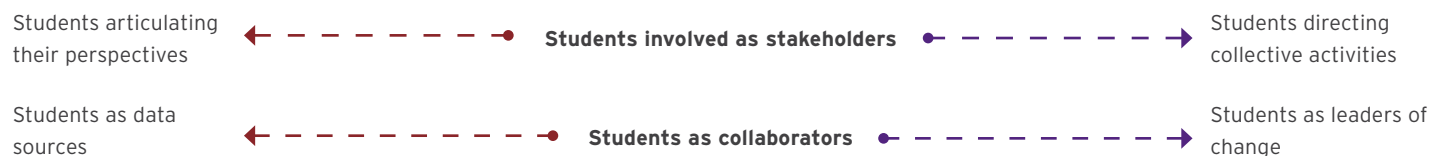
Student-centered classrooms that capitalize on the power of self-determination can substantially increase achievement and motivation. Promoting student voice also has been linked to other important educational outcomes, including: elevated achievement in marginalized student populations; greater classroom participation; enhanced

school reform efforts; better self-reflection and preparation for improvement in struggling students; and decreased behavior problems.

At its core, student voice is the antithesis of depersonalized, standardized, and homogenized educational experiences because it begins and ends with the thoughts, feelings, visions, and actions of the students themselves. This makes student voice profoundly student centered.

Toshalis and Nakkula illustrate the range of experiences that make up the spectrum of potential student voice-oriented activity in a classroom (*see figure*). Student influence, responsibility, and decision-making roles increase from left to right. Most student voice activities currently in schools consist of less-intensive involvement, in the forms of expression, consultation, and some participation. Increasing partnership, activism, and leadership would motivate more students to make an effort and, ultimately, to succeed.

THE SPECTRUM OF STUDENT VOICE ORIENTED ACTIVITY

Students articulating their perspectives ← — — — — — — • **Students involved as stakeholders** • — — — — — → Students directing collective activities

Students as data sources ← — — — — — — • **Students as collaborators** • — — — — — → Students as leaders of change

Expression	Consultation	Participation	Partnership	Activism	Leadership
Volunteering opinions, creating art, celebrating, complaining, praising, objecting	Being asked for their opinion, providing feedback, serving on a focus group, completing a survey	Attending meetings or events in which decisions are made, frequent inclusion when issues are framed and actions planned	Formalized role in decision making, standard operations require (not just invite) student involvement, adults are trained in how to work collaboratively with youth partners	Identifying problems, generating solutions, organizing responses, agitating and/or educating for change both in and outside of school contexts	(Co-)Planning, making decisions and accepting significant responsibility for outcomes, (co-)guiding group processes, (co-)conducting activities

Most student voice activity in schools/classrooms resides at this end of the spectrum.

The need for adults to share authority, demonstrate trust, protect against co-optation, learn from students, and handle disagreement **increases** from left to right.

Students' influence, responsibility, and decision-making roles **increase** from left to right.

SELF-REGULATION

No matter how enjoyable learning can be, everyone—adults, children, and teens alike—struggles at times to stay focused, remain on task, and do the hard work of learning new things. Research shows that people learn best when they self regulate; their own internal focusing processes play a crucial role in engagement and the capacity to do difficult academic work. Students must decide first that they will try, then muster the necessary techniques to sustain their effort until they have made progress.

Cognitively, self-regulated learners plan, set goals, organize, self-monitor, and self-evaluate at various points while building new knowledge or skills. They tend to be self-starters who seek advice, information, and places where they are most likely to learn. Perhaps most important, self-regulated learners can change based on their assessments of the effectiveness of their learning strategies.

However, many students have difficulty self-regulating and engaging in classroom activities even when they want to. For these students, it may be necessary to teach self-regulation skills explicitly, to show them how people can manage their engagement in learning, and to give them an assortment of tools to try out. The good news is that self-regulation is among the more teachable skill sets. Ideally, this might involve developing a middle school course akin to "Introduction to Your Mind, Part 1," with a companion Part 2 for high school students. The focus would be insights and activities from learning theory, cognitive science, brain research, and educational psychology to acquaint students with the workings of the brain and the supports and strategies necessary to help it develop.

Studies have shown that teaching naïve, novice, competent, and expert students how to continue to build on the self-regulatory strategies they have developed can elevate students' content learning, writing, time management, and athletic performance. These skills may even be more important than the content we hope they learn along the way.

DISENGAGING FROM DIGITAL DISTRACTIONS

Self-regulation is arguably more important today than ever before. With the daily deluge of media, the glut of information at our fingertips, and the ubiquity of digital devices pumping out music, video, texts, and games, it is no wonder that distractibility is an issue for many youth (and adults).

Recent research has shown that the "noise" of myriad digital distractions threatens productivity and cognitive complexity in learning. Therefore, academic engagement is as much about selective disengagement—unplugging, as it were—as it is about the decision to focus attention and apply effort.

Recent brain research reveals that our brains are indeed capable of doing many things simultaneously as long as those things do not require much complexity and the costs for making errors is low. However, when the individual attempts to switch rapidly back and forth between competing activities—multitasking—the brain is limited in its capacity to do those activities well. The parts of the prefrontal cortex responsible for controlling impulses, weighing opinions, constructing arguments, making meaning, and solving problems are incredibly complex, but they are also quite slow in comparison to the more primal parts of the brain responsible for quick reactions, unconscious habits, and the "fight or flight" response. In short, multitasking hinders the deepest forms of engagement our brains need to learn complex things.

If opportunities to reduce distraction and sustain focus are not provided (or enforced) for children and adolescents, the phenomenon of "continuous partial attention" associated with chronic multitasking can literally rewire the brain in ways that make higher-order thinking, impulse control, and focus difficult. To access the most sophisticated parts of their brains, students require the elimination of competing disruptions, either through self-generated strategies of regulation or outside restrictions via teacher (and parent) monitoring. For these reasons, the infusion and use of technology in schools needs to be monitored judiciously.

Helping students to experience their own minds in this way is one of the most powerful contributions we can make to their development and learning. Ultimately, the core of student-centered motivation and engagement entails engaging deeply with one's own thinking.

ABOUT THE AUTHORS

Eric Toshalis, Ed.D., is an assistant professor at the Graduate School of Education and Counseling at Lewis & Clark College in Portland, Oregon, where he directs the Summer Middle and High School Level Program and teaches adolescent development and classroom management. Dr. Toshalis is the co-author, with Michael J. Nakkula, of *Understanding Youth: Adolescent Development for Educators* (Harvard Education Press 2006).

Michael J. Nakkula, Ed.D., is a practice professor and chair of the Division of Applied Psychology and Human Development at the University of Pennsylvania's Graduate School of Education. He teaches courses on adolescent development and the intersection of counseling, mentoring, and education within urban public schools. He is the lead author of *Building Healthy Communities for Positive Youth Development* (Springer 2010).
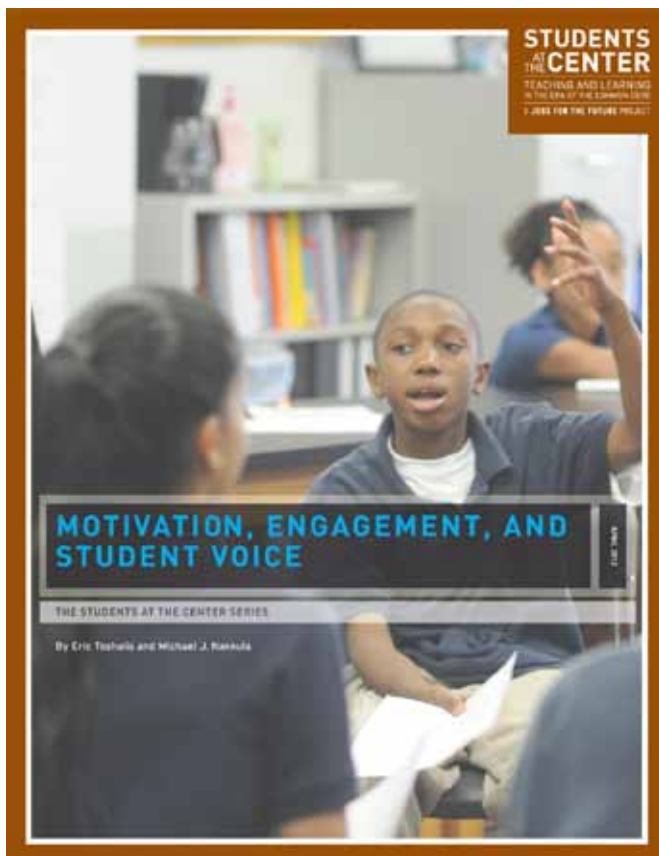
Motivation, Engagement, and Student Voice

This synthesis of research on achievement motivation, school engagement, and student voice, concludes that the more educators use student-centered approaches to reinforce student agency, the more motivation and engagement are likely to rise.

To download the full paper, go to www.studentsatthecenter.org

TEACHERS AT WORK
SIX EXEMPLARS OF EVERYDAY PRACTICE

By Barbara Cervone and Kathleen Cushman

EXECUTIVE SUMMARY
THE EDITORS, *STUDENTS AT THE CENTER* SERIES

What do teaching and learning actually look like in student-centered schools? In visits to six such schools, Barbara Cervone and Kathleen Cushman observed a range of proven models for enacting student-centered learning that are raising academic achievement for underserved populations.

Through interviews with teachers, students, and administrators and observations of them at work—in classrooms, teams, exhibitions, and the community—the authors found that student-centered learning environments are varied and emerge from specific local conditions. At the same time, all student-centered learning environments share a common foundation of practices. These begin with teachers supporting students in developing a new relationship to learning. Moreover, student-centered learning—where adolescents exercise both choice and responsibility—demands a new approach to teaching, which involves facilitating and coaching more than direct instruction. Student-centered teachers develop a fresh relationship to their craft, playing multiple roles at each moment and always learning new skills.

Cervone and Cushman found that:

> Student-centered teachers support each student in developing a new relationship to learning—defined by ever more complex challenges, increasing autonomy, and expanding awareness of connections of one's own work to the larger world.

> Student-centered teachers forge a new relationship to teaching—one in which the teacher constantly shifts among multiple roles, from curriculum planner, classroom facilitator, and assessor, to advisor and community connector.

> Student-centered teachers see themselves as continual learners. Student-centered teaching requires common planning time so teachers can collaborate, as well as opportunities for their classrooms to be observed by skilled peers so they can improve their practice based on ongoing, constructive feedback.

> Each student-centered school reflects and responds to its origins and local context. And each school evolves, thanks to a culture that encourages teachers to try new things and move past ineffective practices.

The Research Schools: Six Exemplars of Everyday Practice

The study looked at six high schools, representing a range of models for enacting student-centered learning:

> **Alief Early College High School**, a partnership with Houston Community College, is part of the Early College High School Initiative.

> **Bronx International High School**, part of the Internationals Network of Public Schools, serves primarily immigrants and non-native English speakers.

> **The Dayton Early College Academy**, located on the campus of the University of Dayton, is part of the Early College High School Initiative.

> **MetWest**, one of 60 Big Picture Learning schools, is part of the Oakland (California) Unified School District.

> **NYC iSchool**, a flagship for the NYC Department of Education's new Innovation Zone, is a collaboration with Cisco Systems

> **Noble High School**, a rural comprehensive high school in southern Maine, is part of the Coalition of Essential Schools.

Almost all of the students at these schools are low-income and minority, and most will be the first in their families to attend college. All of the schools except Noble are small, with fewer than 500 students.

TEACHERS SUPPORT EACH STUDENT IN DEVELOPING A NEW RELATIONSHIP TO LEARNING

What does teaching look like when it centers on students' learning needs? Eight core elements give rise to deep adolescent learning. While many engaging practices are apparent in the six schools, these elements were chosen for their prevalence and, in some cases, their inventiveness. Each element makes a meaningful difference in the effectiveness of the learning environment for the students on whom they center.

The foundation of each teaching element is supporting every student in developing a new relationship to learning—defined by ever more complex challenges, increasing autonomy in addressing those challenges, and expanding awareness of the connections of the learner's work to the larger world. The elements act in a dynamic relationship, affecting and contributing to one another. Student-centered teaching is not a single strategy but rather a cultural shift involving virtually every aspect of what takes place in a school.

ELEMENT 1:
STRONG RELATIONSHIPS WITH STUDENTS

Teachers who take the time to know their students well can create trusting and respectful relationships that support learning. Acting as coaches and facilitators as well as the providers of knowledge, they often develop students' academic knowledge and skills through collaborative interaction. Many other adults also become involved, inside and outside school.

> **Practices include:** Teacher-student advisement to keep a close eye on individual social, emotional, and academic development; norms of trust, respect, and inclusiveness; easy contact between teachers and students; reaching out to families; connecting students with community mentors

> **Example:** Every school studied includes community mentors as part of a critical web of adult-student relationships. The Dayton Early College Academy connects students with writing mentors, college students, and lifetime readers who share their passion for books. A Dayton staff member explained: "If there's one thing this school recognizes for sure, it's that students at this school need every adult on deck."

ELEMENT 2:
PERSONALIZATION AND CHOICE IN CURRICULAR AND INSTRUCTIONAL TASKS

Adolescents place a high value on taking charge of their own lives. When they initiate and have a say in learning activities, they invest in them more.

> **Practices include:** Students creating and monitoring personal learning plans; exercising substantial choice among assignments, readings, and topics; demonstrating mastery in different forms and media; pursuing independent projects and extended learning opportunities that build on special interests, involve public presentations, and often are graduation requirements

> **Example:** Several schools require students to design personal learning plans, much like the individualized educational programs that federal law requires to meet the needs of students with disabilities. All ninth graders at NYC iSchool take a quarter-long course on the psychology and neuroscience of learning. This helps them to figure out how they each learn best and create their own plans for learning at school and beyond. At a 20-minute conference with parents and the advisor four times a year, each student reviews his or her work and chooses personal and academic goals for the next quarter. At the end of tenth grade, the students personalize their plans further, with each choosing an academic "focus area" to explore in depth before graduation.

ELEMENT 3:
APPROPRIATE CHALLENGE LEVELS FOR EACH LEARNER, LEADING TO STRETCH

The key is to know students well enough to set tasks that are neither too easy nor too hard, and to set in motion a cycle of effort, practice, intrinsic satisfaction, and growing confidence. This often counters past feelings of being discouraged or humiliated by academic failure.

> **Practices include:** Scaffolding; differentiating instruction; instilling habits of practice and revision; providing thoughtful supports for students with special needs

> **Example:** Student-centered teaching scaffolds instruction and differentiates learning tasks, so that each individual is ready for just the right stretch. At MetWest, teacher-advisors focus on habits of persistence and revision. A veteran English teacher describes how she scaffolds writing: "Basically it's teaching them how to be

their own best editor. . . . Part of that . . . is letting go a little bit as time goes by. We don't hold their hands too much, or they can't get to that next place and do it themselves." Bronx International uses the term "Not Yet" as an assessment code to send students a clear signal to keep trying until they get it.

ELEMENT 4:
SUPPORTING SOCIAL AND EMOTIONAL GROWTH AND IDENTITY DEVELOPMENT

An adolescent's central developmental needs include forming an identity, belonging, being heard, feeling powerful, and understanding the world. Student-centered approaches take into account students' conflicting narratives, such as "I am bad at math" or "I can do whatever I put my mind to."

Practices include: Knowing students well and educating the whole child; requiring personal reflection; nourishing peer relationships, teamwork, and mentoring; coaching students how to present themselves in public

Example: Reflection is integral: The schools routinely require students to complete reflective writing assignments, keep response journals when reading, and include their own "takeaways" in reports and presentations. Three schools require a 25-page autobiography for graduation. Noble students participate in a student-led "roundtable" before a panel, each year focusing on a different question: Who am I? Where am I going? How will I get there? How can I exhibit what I have learned?

ELEMENT 5:
ANYWHERE, ANYTIME, AND REAL-WORLD LEARNING

With their developmental drive to "become someone" in the larger world, adolescents often feel constrained when their learning is confined to the classroom. Recognizing this, the schools open their doors wide in all directions.

Practices include: Flexible schedules; enabling students to participate in outside activities like internships; encouraging community members as partners in curricula, instruction, and assessment

Example: Several schools ground much of the curriculum in real contexts in the larger community. At MetWest, this focus emerges naturally from the central role of internships in each student's learning. For example, interns at the American Friends Service Committee collaborated on creating a media campaign,

including a press kit and a grant proposal to highlight the situation of undocumented youth after the DREAM immigration act failed in Congress.

ELEMENT 6:
TECHNOLOGY THAT IS INTEGRAL TO TEACHING AND LEARNING

Technology is changing the way teaching and learning take place in classrooms. The six schools in the study fall at various points along the spectrum of how much they integrate technology into what they do so well.

Practices include: Online learning adapted to the needs of each student; online tools that promote student collaboration; heavy reliance on email to reach teachers whenever needed

Example: NYC iSchool students have Internet access to all assignments, teacher feedback, reading material, multimedia content, class notes, self-correcting quizzes, and group discussion boards. Video conferencing via Skype connects them with peers worldwide. In an iSchool module called "Sixteen," two classes interviewed teenagers from around the world, using anthropological methods to compare adolescence in different cultures.

ELEMENT 7:
CLEAR, TIMELY ASSESSMENT AND SUPPORT

Training young people in intellectual inquiry involves teacher and novice looking together at exemplary work and analyzing what makes it good.

Practices include: "Just in time" feedback; exhibitions; customized assessments; student feedback to staff on curriculum and instruction

Example: All students share their work publicly and receive feedback through a detailed rubric, demonstrating their readiness to move forward. The practices vary in timing, the stakes involved, and the media students use, but all share the value placed on "show what you know." To graduate, Bronx International students must complete a major culminating task in each core subject area: math, English language arts, social studies, and science. Each senior assembles these tasks in a portfolio, along with a resume, personal essay, and statement of future goals, and presents it in an hour-long exhibition before a panel of classmates and teachers and sometimes community members.

ELEMENT 8:
FOSTERING AUTONOMY AND LIFELONG LEARNING

Most of the practices described underscore one of the most unique features of student-centered learning environments: giving students the opportunities, skill sets, and work ethic they need to become independent learners. Teachers strike a fine balance between encouraging students to be self-directed and keeping a close watch.

> **Practices include:** Building skills for planning, managing time, self-pacing, taking initiative, and learning how to learn

> **Example:** To track daily work and projects, DECA students fill out daily planners and Bronx International students use laptops.

STUDENT-CENTERED TEACHERS FORGE A NEW RELATIONSHIP TO TEACHING

Student-centered schools depend on classroom practices and structures, as well as the ability of staff to take on a range of roles in the course of each day. The schools studied support all teachers in forging a new relationship to teaching—one where they serve in multiple capacities, from curriculum planner, classroom facilitator, and assessor to advisor and community connector.

Curriculum Planner: Developing curricula is a constant aspect of the work. Most student-centered schools replace textbooks with multiple sources for ideas and materials. They choose depth over the wide coverage typical of texts. Teachers collaborate with colleagues whenever possible to design and revise lessons. Many go to great lengths to integrate their teaching across disciplines. For example, a three-week Noble High School unit on immigration took the place of regular daily English and history classes.

Classroom Facilitator and Coach: Teachers act more as guides than as lecturers. Staff members said this works best when they set up scenarios in which students can explore, ask their own questions, and discover their own answers.

Assessor: Teachers consider assessment an art interwoven with teaching. More than a single test, assessment is an active process that requires teachers to stay alert to evidence of student learning. As teachers circulate in class, they engage with every student in a way that enables them to measure understanding and adjust instruction as needed.

Advisor: Each school structures advising differently, but all of the teachers in the study see the advisor role as central to their work. A Dayton teacher meets with her advisory group students individually once a week, in part because many teens get too little support from home. "Students

build a strong relationship with someone who can support them academically, emotionally, really be there for them, get to know their family, that one-on-one," she explained. "I'm also a motivator and pusher, making sure that students are working on whatever they need."

TEACHERS SEE THEMSELVES AS LEARNERS

Teachers need much of what students require in a truly student-centered learning environment: strong relationships, clear goals, choice, challenge, feedback, autonomy, and a culture of constant personal growth and learning. In fact, a common characteristic of these schools is that all of the educators see themselves as learners as much as teachers, and they recognize that professional development never ends.

The most important professional development is regular, frequent common planning time so teachers can collaborate. They compare notes on shared students and plan curriculum across content areas.

Another critical piece is observation and sharing. These schools open up their classroom doors, creating regular and frequent opportunities for administrators and teaching colleagues to observe, mentor, and learn from one another. They improve their practice based on constructive feedback from peers as well as supervisors.

EACH SCHOOL EVOLVES FROM A PARTICULAR LOCAL CONTEXT

Each school reflects its origins, including its model and local context of policy, financing, and community interests. But each evolves over time, with staff continually examining, rethinking, and revising, not afraid to get rid of what doesn't work and try new things.

All six schools make it a priority to take stock of their progress and shortfalls at regular intervals with respect to student learning. They gather faculty once or twice a year to share and reflect on data—collected not just from standardized test scores, but through close observation and careful listening. Several of the schools survey students and incorporate their feedback and suggestions as they move forward.

ABOUT THE AUTHORS

Barbara Cervone, Ed.D., is founder and president of What Kids Can Do, Inc., an international nonprofit organization that promotes the value of young people tackling projects that combine powerful learning with public purpose. From 1994-2001 she directed Walter H. Annenberg's "Challenge to the Nation," then the largest private investment in public education in the nation's history. Dr. Cervone is a 2008 Purpose Prize Winner.

Kathleen Cushman is an educator and writer who has specialized in the lives and learning of youth for over two decades. In 2001 she co-founded What Kids Can Do, Inc., with Barbara Cervone. Her work there has resulted in nine book collaborations with students, most recently *Fires in the Mind: What Kids Can Tell Us About Motivation and Mastery* (Jossey-Bass 2010).
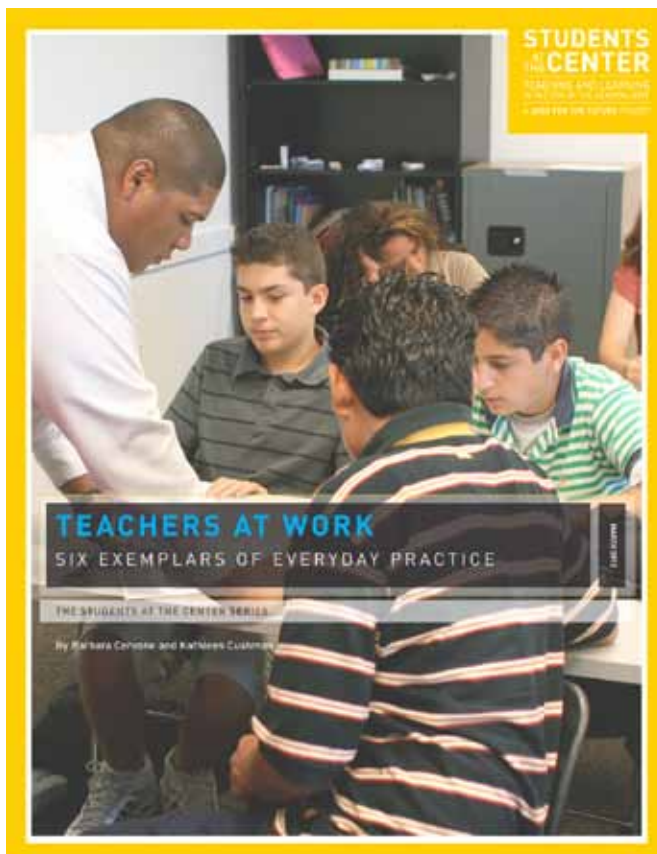
Teachers at Work—Six Exemplars of Everyday Practice

Taking the reader inside six high schools widely regarded as exemplars of deep student learning, the authors unpack teaching practices and school structures at the heart of student-centered learning.

To download the full paper,
go to www.studentsatthecenter.org

LITERACY PRACTICES FOR AFRICAN-AMERICAN MALE ADOLESCENTS

By Alfred W. Tatum

EXECUTIVE SUMMARY
THE EDITORS, *STUDENTS AT THE CENTER* SERIES

Millions of American young people struggle with reading and writing, despite substantial efforts to increase literacy. Although their struggles with reading are not unique, a higher percentage of African-American male adolescents fail to perform at a proficient level when responding to assessment questions on similar passages, according to trend data.

Alfred W. Tatum takes a fresh, cross-disciplinary approach to advancing the reading and writing development of these students. He suggests that efforts to improve achievement through assessment and accountability measures, while useful, underestimate the depths of student needs. He also finds that student-centered approaches to learning have great potential to advance the literacy of African-American male adolescents. Addressing internal and external factors particular to this group—and absorbing lessons from the historical reading and writing practices of African-American writers and leaders—can build resiliency and other critical resources that African-American male adolescents must have in order to succeed in school and in life.

Tatum shows that:

> Many urban school districts responding to federal mandates have adopted a literacy-sanction hierarchy that has failed to yield meaningful improvement in the reading achievement of young African-American males.

> There is virtually no empirical evidence of proven practices that significantly increase the reading achievement of African-American male adolescents.

> Neither the research literature on African-American males nor that on adolescent literacy specifically address the reading achievement of African-American males.

> An appropriate approach takes into account that instructional, sociocultural, and personal factors likely combine to determine success or failure.

> Student-centered approaches to learning are a promising pathway for advancing African-American male literacy development because they have the potential to boost internal and external protective resources.

> Understanding the roles reading and writing played for African-American males historically serves as a productive starting point for conceptualizing teaching practices, selecting texts, and structuring instructional contexts.

> An alternative framework of literacy curriculum and instruction for African-American males, based on four "vital signs of literacy development," begins with developing student identities rather the goal of raising test scores.

INEFFECTIVE FEDERAL SANCTIONS

Broadening the focus of educational reform from equity to both excellence and equity would appear to be promising, yet efforts to ensure high-quality instruction as well as equal resources for the nation's 50 million students in grades 5 to 12 have not improved reading outcomes for African-American male adolescents. Reviewing the research literature, Tatum did not find a single urban school district where 40 percent or more of African-American males read at a proficient level on the grade 8 or grade 12 NAEP. This fact is all the more alarming given that reading comprehension forms the foundation for all learning beyond fourth grade—and for adult functioning in society.

Federal policies and mandates, while warranted, can unintentionally make it more difficult to provide high-quality literacy instruction to young African-American males. For

example, teachers in an urban school district can be in full compliance with school-level mandates, principals can be in full compliance with district mandates, districts can be in full compliance with state mandates, and the state can be in full compliance with federal mandates—and yet we see only small upticks in reading achievement. These minor gains, usually associated with more (though not necessarily better) reading instruction, will fall short of preparing all students for college and careers.

FEW PROVEN INSTRUCTIONAL PRACTICES

The use of accountability assessments in secondary schools increases incentives for schools to push out failing or marginal students before graduation. Researchers on multilayered systems of accountability have shown how district leaders use "checklisting"—that is, determining if certain practices are in place—as a tool of accountability. A closer look reveals how this practice fails to lead to higher reading achievement in urban high schools.

It has been relatively easy to take several important steps in accountability systems: monitor the achievement gap; establish school-based expectations; set priorities to help struggling readers at the high school level. However, it has proven much more difficult to identify strategies that help struggling readers at the high school level. There is virtually no empirical evidence of a critical piece: the identification of proven practices that significantly boost the reading achievement of a high percentage of African-American male adolescents who enter urban high schools as struggling readers.

Moreover, the reading lessons offered to African-American male adolescents are often based on assessment scores framed within the context of data-driven instruction that place them in remedial reading classes. In these classes, they commonly receive less demanding or poorly conceptualized reading instruction. Remedial classes often require students to read less than peers in regular classes and students suffer from underexposure to quality texts. These less-demanding academic pathways for struggling African-American male readers result in permanently low levels of literacy and thus reify social inequality.

FACTORS AFFECTING READING ACHIEVEMENT

The research literature on reading does not address the reading achievement of African-American males specifically. The broad contexts in which the literacy development of these young men should be developed sits at the intersections of reading research, urban school reform, and a wide array of social, economic, and political forces. Fortunately, the past decade has seen a large body of research on both in-school and out-of-school factors that contribute to the general academic performance of African-American males.

Drawing on these resources, three types of factors may affect the reading achievement of African-American male adolescents: instructional, sociocultural, and personal.

Instructional research has identified essential elements of teaching reading comprehension, such as differentiating instruction, building subject-matter knowledge, expanding vocabulary, integrating reading and writing, encouraging classroom discussion, and providing exposure to a volume and range of motivating texts.

Sociocultural research provides evidence that many variables—such as culture, social class, home literacy and language experiences, family background, and environmental factors—work together to interrupt reading achievement. For example, far too many African-American male youth come from homes without the rich language experiences—such as frequent engaged reading and vocabulary knowledge—common in more affluent, white homes.

Research into personal factors shows that certain individual experiences and behaviors contribute to reading achievement. These include effort, time, and persistence, as well as positive attitudes toward school and connection with long-term goals. Moreover, embracing an ethnic group identity may enhance school engagement for African-American males, which in turn will increase achievement. This contradicts the notion of oppositional identity and rejects the idea that African-American students do not want to be viewed as smart to avoid "acting white."

These factors do not act independently; it is their overlap—the multifactor impact—that determines pathways of success or failure.

ADVANTAGES OF STUDENT-CENTERED APPROACHES

Student-centered approaches to learning have great potential to advance the literacy of African-American male adolescents by helping students build resiliency and other critical protective resources they need to address the above factors.

Researchers have identified both internal and external sources of these protective resources. Internal factors include a person's academic skills, a strong self-concept, and community supports. Specific external factors that promote resilience include the involvement of a consistently caring adult, positive expectations, and opportunities for meaningful participation—all priorities of student-centered approaches.

Quality teaching and quality texts are also essential. To provide these, educators need a clear concept of the roles of literacy instruction, a sincere interest in contributing to the personal development of African-American males, and knowledge of a wide range of texts across disciplines that can help prepare African-American males for engaged citizenship at local, national, and international levels.

HISTORICAL LITERACY ROLES OF AFRICAN-AMERICAN MALES

Understanding the roles reading and writing played for African-American males historically serves as a productive starting point for conceptualizing quality teaching practices, selecting texts, and structuring instructional contexts that align with student-centered approaches.

A socio-historical perspective provides insight into the wide range of reasons that African-American males of the past practiced literacy. In the 19th-century educational movement of the urban North, for example, African Americans practiced literacy, among other reasons, in order to improve their social and economic status; strive for racial uplift; advance the economic, social, and political aims of the community; tear down the walls of discrimination; and advance human liberty.

Other historical accounts indicate a focus on the development of self identity, personal engagement, and transformation. For example, African-American males formed literary societies in Northern cities in the early 1800s not only to improve their reading and writing skills but also to cultivate a scholarly way of life.

Today's emphasis on standards, rigor, and assessments is a radical departure from the historical roles of literacy development for African-American young men. Most federal, state, district, and school efforts lack a focus on helping these young males strengthen their identities and embrace reading as a cultural practice in meaningful contexts, often ignoring or suppressing their need for intellectual development.

AN ALTERNATIVE FRAMEWORK FOR LITERACY DEVELOPMENT OF AFRICAN-AMERICAN MALE ADOLESCENTS

One way to reconnect young African Americans with their historical traditions of reading and writing—and to improve their achievement and meet their out-of-school needs—is to focus on multiple facets of literacy development, rather than only building foundation skills. Tatum proposes a broad framework that shifts the focal point from raising standardized test scores to developing student identities. The new framework, which emerges from the intersection of several bodies of literature, is based on his work on four vital signs of literacy development (see box). Ultimately, it is designed to help practitioners provide literacy instruction to increase the number of African-American male high school graduates who are prepared for advanced postsecondary academic studies.

Central to this framework is providing quality instruction and rich texts with multiple entry points—personal, economic, and community; social, cultural, and gender; local, national and international. This has implications not just for instructional and professional preparation strands but also for theoretical strands.

Instructional strands focus on knowledge of effective reading and writing research practices, strategies for mediating texts, and developing a useful comprehensive assessment profile. Professional development strands focus on initial teacher preparation and ongoing professional development to provide additional support that even knowledgeable teachers may require to lead African-American male adolescents to high achievement.

The theoretical strands should be considered when planning how best to provide literacy instruction and professional development. They address one's conceptualization of the role of literacy instruction and one's approach to teaching. This must include an idea of improving the life

circumstances of African-American males. And it could include a dual focus on both college and career readiness, with a long-term aim of increasing earnings, as well helping African-American males to become good men and to restore their confidence in reading and writing as tools of human development.

Tatum's socio-historical approach suggests that student-centered learning is conceptually sound for advancing the literacy development of African-American male adolescents. For this group, he says, student-centered learning has to be essentially race-based and gender-based.

This approach will encounter resistance from those who believe that all students are the same and that there is no need to honor students' differences. It is crucial for new strategies to be well thought out to avoid becoming just another failed experiment. The current political landscape affecting schools, policies, and curricula can lead to a symbolic, piecemeal approach to student-centered strategies rather than a substantive change.

VITAL SIGNS OF LITERACY DEVELOPMENT

Vital signs of reading: These are designed to improve reading and writing skills and nurture language development. They constitute a necessary minimum for all literacy efforts. The working tools are decoding, self-questioning, using language, monitoring comprehension, summarizing, and other strategies students need to handle and produce text independently. The other vital signs also affect reading outcomes.

Vital signs of readers and educators: These pay attention to students' lived experiences, both in school and outside of school, and are useful for considering ways to improve the human condition.

Vital signs of reading and writing instruction: These are useful for conceptualizing the rationale for literacy teaching. They are intimately related to rescuing and refining the significance of literacy instruction and helping us conceptualize the rationale for providing it. Educators must focus on quality support, appropriate texts, assessments, and potential uses of technology in order to maximize opportunities to shape rigorous adolescent literacy.

Vital signs of educators' approaches: Teachers need a strong foundational background for teaching geared to the vital signs of reading. Educational contexts must be characterized by competence, commitment, caring, and culpability. Adolescents benefit when they know they belong in the learning community and feel that they are in the presence of an adult advocate who is not going to give up on them.

ABOUT THE AUTHOR

Alfred W. Tatum, Ph.D., is an associate professor at the University of Illinois at Chicago. He also serves as the director of the UIC Reading Clinic where he hosts an annual African American Adolescent Male Summer Literacy Institute. He authored the award-winning book, *Teaching Reading to Black Adolescent Males: Closing the Achievement Gap* (Stenhouse Publishers 2005). His second book, *Reading for Their Life: Re(Building) the Textual Lineages of African American Adolescent Males*, was published by Heinemann in August 2009.
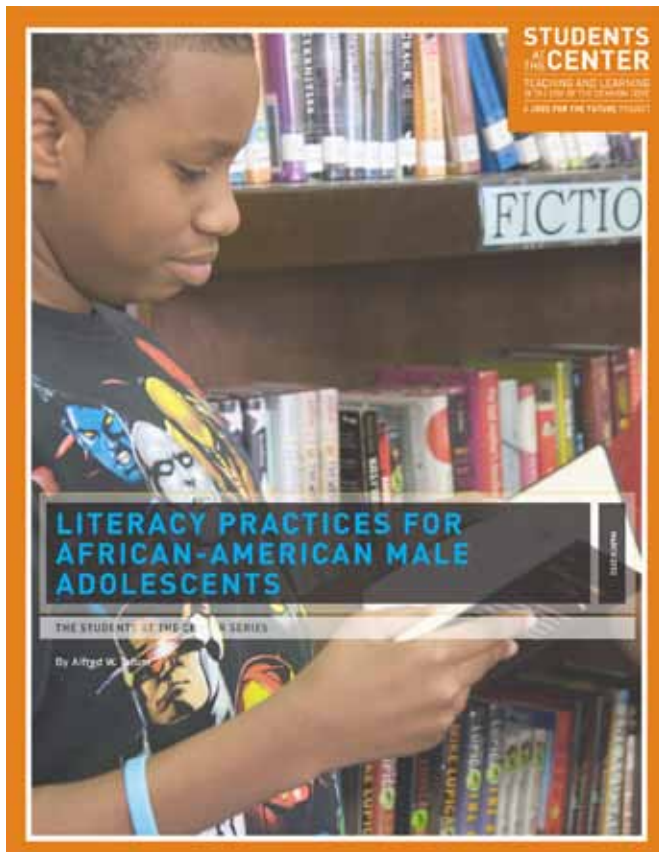
Literacy Practices for African-American Male Adolescents

Providing a socio-historical perspective on African-American literacy, this paper discusses student-centered learning in the context of race and gender and proposes an improved approach to literacy instruction for African-American males.

To download the full paper, go to www.studentsatthecenter.org
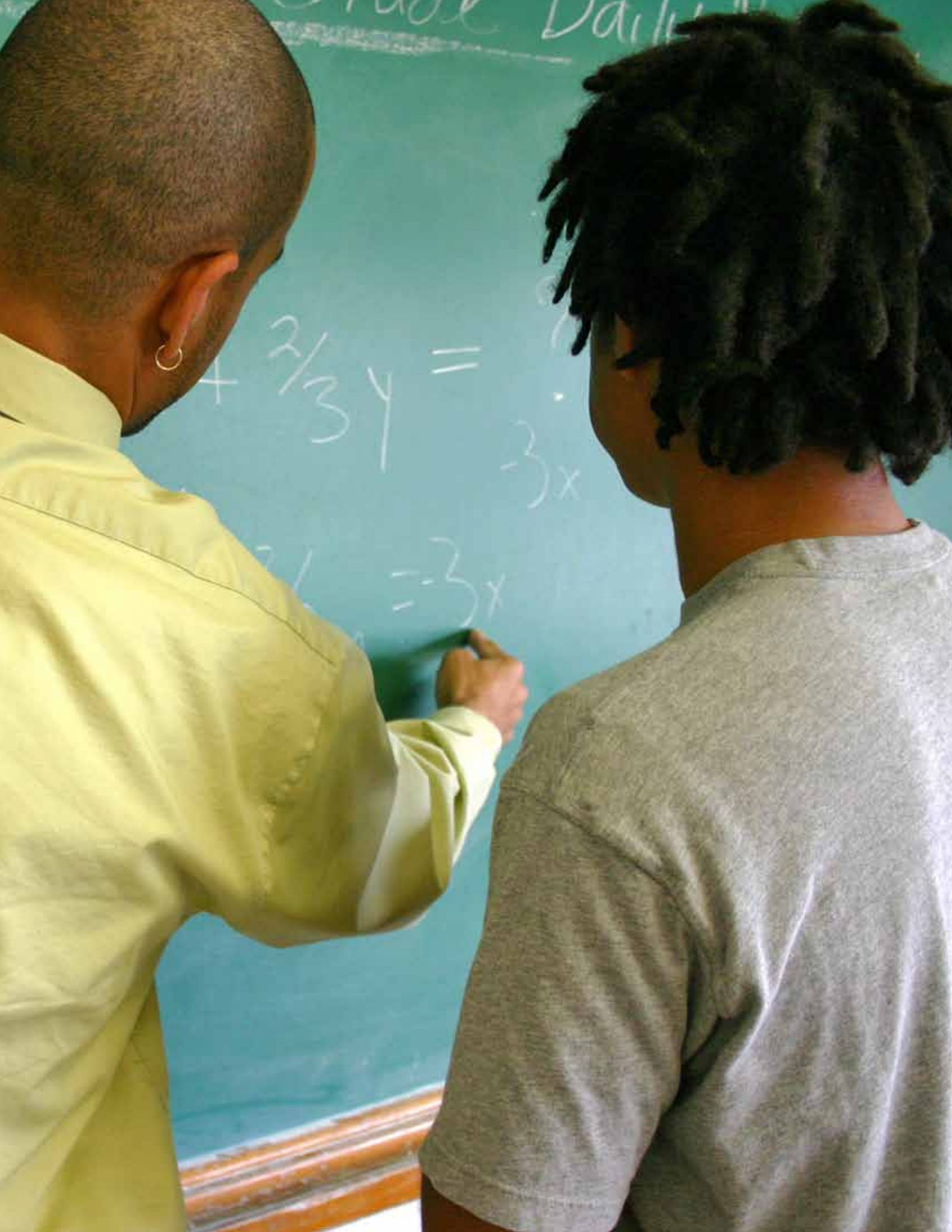
LATINO/A AND BLACK STUDENTS AND MATHEMATICS

By Rochelle Gutierrez and Sonya E. Irving

EXECUTIVE SUMMARY

THE EDITORS, *STUDENTS AT THE CENTER* SERIES

Too many Americans struggle with mathematics, and far too many in this group are Latino/a and black adolescents, particularly from low-income backgrounds. This paper focuses on how we can better engage these populations in mathematics and improve their achievement, but speaks to the broader challenge of improving math outcomes of all young people. Recent research focusing on mathematics as a social activity rather than as a matter of cognition alone suggests that school instruction in how to "think mathematically" is not a sufficient answer. Using new perspectives on learning outside of school, Rochelle Gutierrez and Sonya E. Irving argue that mathematics teachers need to initiate students into mathematical communities and practices, helping adolescents see themselves as "doers" of mathematics. This paper examines four research areas that challenge and add to the standard math taught in school: ethnomathematics; how adults use learning math outside school; afterschool math programs for youth; and social justice mathematics. Gutierrez and Irving combine these fields and draw out key features to offer a more comprehensive vision of what student-centered learning in mathematics could be and how it could help support Latino/a and black students in particular.

Key findings from this research include:

> The forms of mathematics that U.S. schools value are not the only mathematics that people use. Different cultures practice different kinds of mathematics, learn them in different ways, and use them for different reasons.

> How students feel about themselves while doing mathematics is critical to how much they engage with it. Out-of-school experiences can help a person develop confidence, a larger repertoire of math strategies, and a math identity built upon his or her culture or community—all of which contribute to school learning.

> Small-group learning, which is more common in afterschool programs than in regular classrooms, provides more opportunities for students to explain their thinking, get feedback quickly, and refine their thinking based on a variety of perspectives.

> Teaching mathematics through social justice issues can motivate adolescents—especially those who have lost interest in traditional mathematics—to learn the math skills necessary to solve complex problems.

To increase achievement among black and Latino/a students, Gutierrez and Irving recommend combining several approaches: build the personal and cultural experiences of learners; nurture self-confidence and mathematical identity; and use real-world problems and peer involvement to increase motivation and mathematical rigor.

STUDENTS IN DIFFERENT CULTURES LEARN AND USE MATHEMATICS DIFFERENTLY

As anthropologists have documented, people around the world do mathematics, including counting, measuring, locating, designing, playing, and explaining. However, as ethnomathematics research shows, the forms of mathematics we value in U.S. schools—Euclidian geometry, Cartesian coordinates, the base-10 counting system—are not the only mathematics that people use. Indeed, different cultures practice mathematics in different ways and for different purposes. Many people use mathematics not just to display knowledge to others in school (i.e., get good grades), but also to accomplish something in everyday life (i.e., solve real-world problems). For example, the residents of the Marshall Archipelago, where sailing is integral to life, use stick charts that rely upon unique geometric and algebraic renderings of the oceans.

Many of the cultures documented in ethnomathematic studies have had no formal schooling. Rather than learning from official "teachers," people learn sophisticated mathematical methods from others in their communities, who often take them as apprentices and show them how to use math to accomplish certain tasks.

With a focus on the perspectives of learners, recent research points to the importance of students having personal or cultural reference items for learning mathematics. A study of women 14 years and older in the suburbs of Brazil, for example, indicated that the ability to work with familiar objects (e.g., beans, rice, sugar) made doing school math easier.

Such research raises important questions for student-centered approaches to learning mathematics in U.S. schools. For example, would students find mathematics more interesting if they learned the history of math and the different ways that cultures across the world still use math today? Would students who are immigrants learn more if schools encouraged them to use forms of mathematics they knew from their home countries?

STUDENTS ARE MORE MOTIVATED TO DO MATH WHEN THEY FEEL GOOD ABOUT THEMSELVES

Research suggests that how students feel about themselves while doing mathematics is critical to whether or not they engage fully in mathematical activities. Important steps to motivate students who might not otherwise be engaged in mathematics classrooms include developing their confidence, using a larger repertoire of mathematical strategies, and fostering a mathematical identity that builds upon their culture or community.

Afterschool programs seem to offer opportunities for students to develop a kind of identity around mathematics, addressing the call from the Common Core State Standards that students create a mathematical "character." In one study, students in an afterschool program reported feeling more confident about asking questions, completing homework, and challenging the mathematical justifications of others. This sense of confidence can go a long way toward individuals' seeing themselves as mathematical people and in persisting in solving difficult math problems. This is especially important in the face of ongoing negative stereotypes among teachers about black, Latino/a, and low-income students as unable to do math.

Studies of Latino/a parents learning mathematics suggest that building upon students' previous cultural experiences—what some researchers have termed "funds of knowledge"—also can help address issues of equity in schools. One model is for teachers to go into the community and observe and interview families about the kinds of activities (e.g., chores) students do at home. Teachers then can build upon these forms of expertise in the classroom, although it is a time-consuming task.

However, research reveals a repeated pattern across sites when it comes to current practice in mathematics class: students are implicitly taught to ignore their out-of-school experiences. In contrast, the school walls could be more permeable. Just as teachers could visit students' homes, they could bring students into the community to study how people use mathematics in their everyday lives. Teachers could invite community members into the school to talk about the kinds of things they do and how those relate to mathematics. These approaches might help students build a stronger identity as doers of mathematics and, therefore, increase their interest in knowing how their practices relate to formal, abstract mathematics taught in school.

SMALL-GROUP LEARNING PROVIDES QUICK, CRITICAL FEEDBACK

Learning in small groups, which is more common in afterschool mathematics programs than in typical classrooms and summer schools, has stronger impact on students than does whole-group instruction or a focus on one-on-one tutoring. This suggests that students may benefit from peer interaction as they collaborate with one another to solve non-routine problems—and that they benefit from more opportunities for rigorous mathematics thinking.

Research on afterschool mathematics programs also suggests that when students work in small groups, they receive feedback more quickly than they would from a teacher in a large class, and they are more likely to be engaged in higher-level problem solving and making connections to the real world. Students in small groups have more opportunities to explain their thinking, clarify their ideas, and justify their strategies to one another. They can hear, challenge, and build upon a variety of other perspectives as they refine their own thinking.

SOCIAL JUSTICE ISSUES CAN TEACH STUDENTS COMPLEX MATHEMATICAL CONCEPTS

It is always easier to engage students in subjects they care about. Teaching mathematics to Latino/a and black students using social justice issues, which start with contexts familiar to students and appeal to their sense of fairness, can motivate them to learn the mathematical skills necessary to solve complex problems. This appears to be an especially effective approach to reengaging students who may have lost interest in mathematics. It not only connects with their personal and cultural experiences; it also shows the practical applications of mathematics outside the classroom.

The goal is for students to develop mathematical arguments that, when accompanied by representations of data, they can use as they seek to convince others to take certain action to solve a deeply felt problem. For example, a class of sixth graders in one study compared their overcrowded school with the magnet school serving wealthier students one floor below. They calculated the number of students per square foot in both schools and presented it to the school board to ask for help in rectifying the inequity.

Although this form of learning may sound more like what you might see in a social studies classroom, mathematics teachers have tried and succeeded with it for a surprising number of topics, including geometry, calculus, and statistics. But more rigorous research is needed to show just how effective it is in raising student achievement.

EFFECTIVE MATH EDUCATION FOR LATINO/A AND BLACK ADOLESCENTS

Gutierrez and Irving found common themes across the fields of mathematics learning they reviewed. Drawing on these, they recommend four key elements for expanding student-centered approaches to math education and improving math achievement among underserved groups.

BUILD UPON FAMILIAR CONTEXTS AND THE PERSONAL AND CULTURAL EXPERIENCES OF LEARNERS TO MAKE MATH MEANINGFUL.

Traditionally, mathematics teachers have tended to ignore the personal and cultural experiences of learners and offered few meaningful connections to the real world. By contrast, student-centered approaches might encourage mathematics learners to draw upon familiar games, hobbies, community practices, or effective approaches from other countries. Rather than relying on negative stereotypes of their students, educators would need to learn about which experiences are most meaningful to them. Typically, community members who know students deeply have

facilitated processes like these. Community walks, projects that allow students to apply mathematics to problems in their lives, and more personal conversations with students all would help teachers improve student-centered learning for black and Latino/a adolescents.

NURTURE CONFIDENCE AND A MATHEMATICAL IDENTITY IN LEARNERS.

Black and Latino/a adolescents, like all young people, reap the benefits of programs that attend to their academic and their social/emotional needs. Learners show more confidence and are better able to find an answer—and they can reflect on how reasonable that answer may be when they have opportunities to: be active in a learning space; use the languages they speak at home; use mathematics to analyze social injustices; and build upon familiar contexts and personal and cultural experiences. Incorporating the history of mathematics and the views of community members can go a long way toward helping students see that mathematics is not a singular entity, that many cultures have created (and are still creating) it, and that we can combine our personal identities with mathematical ones.

USE AUTHENTIC PROBLEMS AND PEER LEARNERS TO INCREASE MATHEMATICAL RIGOR.

Most mathematics education involves learning procedures to solve problems with one correct answer, even though problems in the real world almost always involve many overlapping variables and the solutions can be far from clear cut. By beginning with problems grounded in the interests of Latino/a and black students, we make it more likely that they will engage in higher-order thinking. Broad social issues might be the most motivating. In addition, it is helpful for adolescents to work with peers in groups, where they can hear different strategies, refine their thinking, and justify their ideas to others—just as in real-life collaborations.

LEVERAGE COMMUNITY MEMBERS TO PERSONALIZE CURRICULA AND CHALLENGE NOTIONS OF "NOVICE" AND "EXPERT."

Bringing in community members, particularly older people who may be unfamiliar with today's mathematics curricula, strategies, and technology, can be more helpful than it might at first appear. Adolescents can "teach" adults about things with which they are familiar, even as they learn from individuals who have a lifetime of knowledge of how mathematics relates to the real world. This blurring of our ideas of novice and expert can help students develop meaningful personal relationships and offer opportunities to "try on" math identities.

The research reviewed in this paper is a starting point for building student-centered approaches to improving mathematics learning for Latino/a and black youth. However, the lack of literature and of longitudinal data on large groups of these populations is a disadvantage. Gutierrez and Irving recommend scaling up the most successful projects and following them for longer periods so that more Latino/a and black adolescents can benefit. In addition, to better understand which formats best serve which purposes, they stress the need to develop more rigorous assessments, pilot them with students of varying ages, and cover a broader range of mathematical topics. And, they conclude, if we are to take seriously the idea of placing Latino/a and black students at the center of learning, they recommend engaging the broader public in the endeavor, especially community-based organizations that have vested interests in supporting youth.

ABOUT THE AUTHORS

Rochelle Gutierrez, Ph.D., is a professor at the College of Education at the University of Illinois at Urbana-Champaign. Her research focuses on equity in mathematics education, race/class/language issues in teaching and learning mathematics, effective teacher communities, and social justice. She has written several articles and book chapters that address the achievement gap, English learners, mathematics teaching in Mexico, and sociopolitical trends in mathematics education. She is working on a book entitled *Developing Academic Excellence and Identity in Mathematics Students: Windows into Urban Teaching*.

Sonya E. Irving, Ed.M., is a doctoral student in the Department of Curriculum and Instruction at the University of Illinois. Her expertise is in evaluative research as a means to support teachers for instructional improvement, especially as it relates to equity in mathematics education. She has worked for several years as a mathematics teacher. She holds a Bachelor's degree from Howard University and a Master's degree from the Harvard Graduate School of Education.
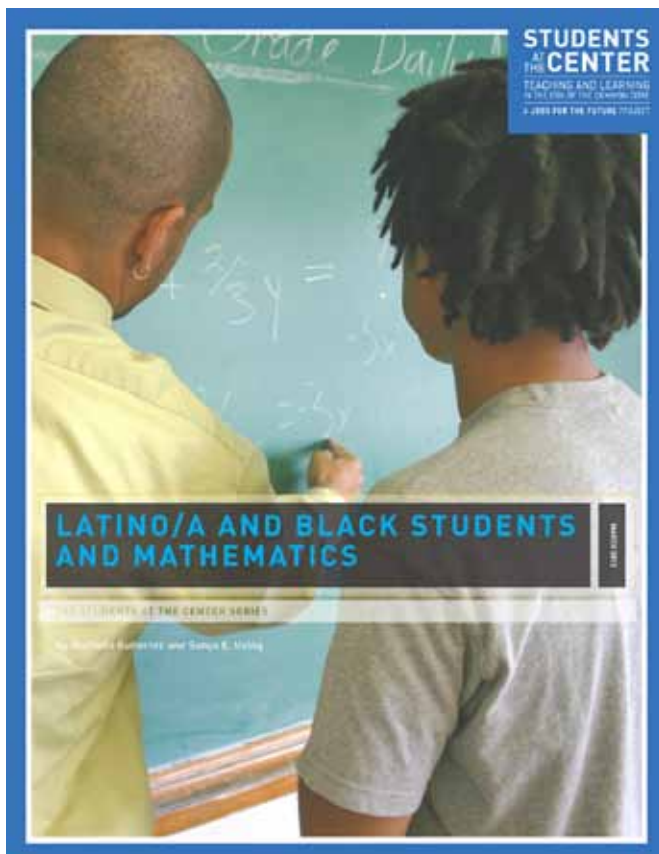
Latino/a and Black Students and Mathematics

Using new perspectives on mathematics as a cultural and social activity and research on learning outside of school, this paper provides student-centered approaches for reducing the mathematics "achievement gap."

To download the full paper, go to www.studentsatthecenter.org

CURRICULAR OPPORTUNITIES IN THE DIGITAL AGE

By David H. Rose and Jenna W. Gravel

EXECUTIVE SUMMARY
THE EDITORS, *STUDENTS AT THE CENTER* SERIES

Most classrooms are "curriculum centered." They are designed around curricula whose core elements—textbooks and other print materials—are standardized or "one-size-fits-all," as the saying goes. Of course, students are anything but uniform. As a result, teachers face inherent hurdles in meeting the individual needs of all their students, and students struggle to learn from curricula that are often inaccessible to varying degrees.

In a radical rethinking of the traditional curriculum, David H. Rose and Jenna W. Gravel consider how advances in teaching technologies enable new curricular designs that offer exciting ways to create classrooms that are student centered. The authors examine both the complexities of learning differences and the neurological variations that underlie these differences, exploding the notion that schools should focus on the mythical "average" learner. To help all students master the skills to succeed in college and careers, Rose and Gravel suggest, curricula must be as differentiated as the learners themselves. In the digital age, they find it can be, through the new field of universal design for learning (UDL).

The authors demonstrate that:

> Advances in neuroscience reveal that the brain is highly differentiated and specialized, with a vast array of strengths and weaknesses not only among different people but also within individuals.

> Multimedia technologies provide an encouraging foundation for student-centered learning, offering educators the ability to customize how and what we teach each student.

> UDL's research-based framework combines neuroscience and technology to optimize learning for every student.

> Using the UDL guidelines, student-centered classrooms can harness the flexibility of new media to provide a diverse range of students with the multiple means of representation, expression, and engagement each needs to become a thoughtful, strategic, and motivated learner.

NEUROSCIENCE AND INDIVIDUAL DIFFERENCES

An explosion of research in neuroscience, arising from new digital imaging and analytic tools, profoundly alters our ability to understand learning and individual differences. Images of the brain in action reveal that its functions are both specialized and highly differentiated. For example, at least 20 regions of the brain specialize in vision; people process information about faces in certain regions and objects like utensils or cars in other regions.

Such findings are crucial for education because different people exhibit mind-boggling variation in strengths. From facial recognition to reading to musical ability, most brain specializations lie along a continuum. Gifted writers may struggle in math; dyslexics may excel at science; people with autism may have perfect pitch.

Individuals are complex composites of variation in a great many different capabilities; the "average" learner is a myth. A learner-centered classroom must meet the challenge of diversity—providing a curriculum that is as differentiated as the learners themselves.

THE PROMISE OF NEW TECHNOLOGIES

In most contemporary classrooms, print is the primary technology for communication and instruction. Its obvious advantages—it is an inexpensive, durable, and portable way to store information—contributed to 500 years in which it was the dominant form for teaching and learning.

Today, the disadvantages of print are equally clear. It is a fixed, standardized medium, perfect for a hypothetical group of people who are similar to one another. But print cannot adapt to meet the needs of all students. People with "print disabilities"—including reading disabilities, as well as blindness or poor vision—face severe disadvantages, as do readers to whom a text is presented in a language other than their own.

In contrast, advances in multimedia technologies provide an encouraging foundation for learning that is student centered. Innovative digital tools can help transform how and what we teach into customized lessons for all. Rather than physically printing or embedding information, new media store information by "digitizing" it as numbers. The information can be recreated as needed, and in a variety of formats—from Braille to voice to translation—for limitless numbers of people. Digital media are versatile, flexible, and maleable; they are also dynamic, changing with time. Moreover, they can be manipulated—the user can act on information, transforming it to make something new, recombining it to solve a problem, linking it to show relationships, modifying it for personal preferences.

THE UNIVERSAL DESIGN FOR LEARNING FRAMEWORK

Given the myriad ways students differ, how can educators determine the essential components of curricula that use new technologies to support student-centered approaches to learning—for all students, not just a few? Universal design for learning is a promising framework for doing that. UDL provides a structure and guidelines for making decisions about instructional designs that meet the challenge of diversity. Many options are built into UDL, based on research and practice from multiple domains within the learning sciences—education, developmental psychology, cognitive science, and cognitive neuroscience.

The theory of UDL derives in part from the broad concept of universal design, a practice that is prominent in architecture: The goal is to engineer the built environment for the widest range of users, with multiple options for access. All U.S. architects are now legally bound to create buildings that are designed from the outset to reduce or eliminate architectural barriers for diverse groups of people. While originally conceived for individuals with disabilities, universal designs have proven to be widely beneficial. A common example is the wheelchair ramp, which is also ideal for people pushing strollers or using handcarts.

Universal design for learning is part of this overall movement. Its purpose is to provide not just access to information but to ensure that the means for learning—the pedagogical goals, methods, materials, and assessments of instruction—are accessible to all.

At its simplest, UDL is based on three principles, each corresponding with one of the three broad divisions of "the learning brain":

1. **Provide multiple means of representation**, which corresponds with the pattern recognition and perceptual capabilities of the posterior regions of the cortex.

2. **Provide multiple means of action and expression**, which corresponds with the motor and executive capabilities of the anterior regions of the cortex.

UNIVERSAL DESIGN FOR LEARNING GUIDELINES

I. Provide Multiple Means of **Representation**	II. Provide Multiple Means of **Action and Expression**	III. Provide Multiple Means of **Engagement**
1: Provide options for perception	**4: Provide options for physical action**	**7: Provide options for recruiting interest**
1.1 Offer ways of customizing the display of information	4.1 Vary the methods for response and navigation	7.1 Optimize individual choice and autonomy
1.2 Offer alternatives for auditory information	4.2 Optimize access to tools and assistive technologies	7.2 Optimize relevance, value, and authenticity
1.3 Offer alternatives for visual information		7.3 Minimize threats and distractions
2: Provide options for language, mathematical expressions, and symbols	**5: Provide options for expression and communication**	**8: Provide options for sustaining effort and persistence**
2.1 Clarify vocabulary and symbols	5.1 Use multiple media for communication	8.1 Heighten salience of goals and objectives
2.2 Clarify syntax and structure	5.2 Use multiple tools for construction and composition	8.2 Vary demands and resources to optimize challenge
2.3 Support decoding of text, mathematical notation, and symbols	5.3 Build fluencies with graduated levels of support for practice and performance	8.3 Foster collaboration and community
2.4 Promote understanding across languages		8.4 Increase mastery-oriented feedback
2.5 Illustrate through multiple media		
3: Provide options for comprehension	**6: Provide options for executive functions**	**9: Provide options for self-regulation**
3.1 Activate or supply background knowledge	6.1 Guide appropriate goal-setting	9.1 Promote expectations and beliefs that optimize motivation
3.2. Highlight patterns, critical features, big ideas, and relationships	6.2 Support planning and strategy development	9.2 Facilitate personal coping skills and strategies
3.3 Guide information processing, visualization, and manipulation	6.3 Facilitate managing information and resources	9.3 Develop self-assessment and reflection
3.4 Maximize transfer and generalization	6.4 Enhance capacity for monitoring progress	
Resourceful, knowledgeable learners	**Strategic, goal-directed learners**	**Purposeful, motivated learners**

Source: CAST (2011)

3. Provide multiple means of engagement, which corresponds with the affective or emotional capabilities in the medial regions of the nervous system.

Nine guidelines, developed from these principles, form the foundation of UDL (*see figure below*). They guide educators and curriculum developers in using research-based means of addressing the wide range of individual differences in any classroom.

The top of each column in the figure emphasizes a basic principle of UDL. At the bottom of each column is a basic goal: students who are, each in their own way, resourceful and knowledgeable; strategic and goal directed; and purposeful and motivated. Each column, in turn, articulates guidelines for achieving each goal, as well as "checkpoints" elaborating on the guidelines.

UDL ONLINE

All that the UDL framework offers is difficult to demonstrate in print. In the Web-based version, clicking on any checkpoint brings up a box with an elaboration of the meaning and importance of the checkpoint. The Web also has links to practical examples of the options recommended and to research evidence for their efficacy. Moreover, many examples and resources cannot be even be demonstrated in print because they are natively interactive, multimedia, and "digital."

For an interactive version of the guidelines, see http://www.udlcenter.org/aboutudl/udlguidelines.

REALIZING THE PROMISE OF NEW TECHNOLOGIES FOR STUDENT-CENTERED LEARNING

Based on UDL's three principles, Rose and Gravel provide a number of examples of how student-centered classrooms can harness the flexibility of new media to provide a diverse range of students with the multiple means of representation, expression, and engagement each needs to become a thoughtful, strategic, and motivated learner.

STUDENT-CENTERED MEANS OF REPRESENTATION

Students differ widely in how they best perceive information, comprehend it, and turn it into useable knowledge. To create a curriculum that can support student-centered learning, it is critical to provide a variety of options for presenting information.

Unlike print, new media have a wide range of capabilities for presentation, from text to spoken language, to full-motion video, to 3-D graphics, to virtual reality, as well as various combinations of these formats. A format such as text can be manipulated in size, color, or form of emphasis to make it easier to see or to comprehend its main points. Text also could be transformed into entirely different modalities, such as voice, American Sign Language, Braille, or other languages.

STUDENT-CENTERED MEANS OF ACTION AND EXPRESSION

A curriculum is not student centered when all students must demonstrate what they have learned in exactly the same way. One set of options is to enable students to express themselves in a variety of media. For example, in addition to writing a paper, students in a science class could work in groups to design an animated presentation of the process of mitosis using SAM Animation, free online software designed specifically for K-12 students and teachers.

That said, providing options in media is not the most important way to make expression more student centered. Within any medium, it is essential to provide "cognitive apprenticeship" so that the thinking process becomes visible. Then the needs of early learners can be calibrated and adjusted as their skills improve, and they can move gradually with support toward independence. Cognitive apprenticeships aid not just early learners but also advanced learners. For example, modeling is one of the most effective techniques for teaching a new skill or strategy. For schools, videos modeling various skills—public speaking, scientific inquiry, painting, social skills—can be embedded in almost any digital medium. This can also be done easily for different levels of learner, a differentiation almost impossible to achieve in print.

Guided practice with graduated scaffolding is another key aspect of effective teaching. Well-designed digital media offer a broad palate of learning supports and challenges that can be fine tuned for each individual. For example, Literacy by Design, a technology-based approach to literacy instruction, uses UDL principles to reach young students with significant cognitive disabilities. Its online design encompasses a range of scaffolds (e.g., a multimedia glossary; videos and photo essays that supply background knowledge; prompts to apply specific reading comprehension strategies). Research indicates significant gains by users on reading comprehension tests and for specific comprehension skills.

Skill development requires timely and relevant feedback. New technologies can provide ongoing assessment data, carefully monitor student progress, and offer relevant, challenging feedback. Teachers can use the data to make instruction more strategic, knowledgeable, and motivating for all.

STUDENT-CENTERED MEANS OF ENGAGEMENT

One of print's biggest limitations is its inability to adjust to the level of frustration, boredom, challenge, or threat a task presents to the individual learner. The same chapter in a book may bore one student, terrify another, bewilder a third–and therefore engage none of them.

New media, by contrast, can provide a rich, interactive panoply of resources for recruiting interest, sustaining effort, and building self-regulation. For example, students seeking to learn about orangutans can take a "virtual field trip" via webcam to the San Diego Zoo. Those doing an extended study of a subject can participate in apprentice communities of practice far beyond their school through a tool like ePals, a free online service enabling students all over the world to connect and share experiences. And digital technologies can adjust the level and type of feedback individuals receive, helping each responds to feedback, develop self-assessment and reflection skills, and gradually become more independent.

CAVEATS ABOUT DIGITAL TECHNOLOGIES

While digital technologies have numerous advantages over print, they have limits as well.

> **Poorly conceived tools:** The usefulness of digital tools depends on their design, which must provide both broad access and learning supports. Poorly conceived digital learning tools give the illusion of progress when in fact they simply replicate print versions; this is the case when scanning a printed document into a digital version.

> **The digital divide:** Many families still lack access to essential technology. According to a Pew Research Center report, 87 percent of U.S. households making more than $75,000 a year have Internet access at home, compared with only 40 percent of households making less than $30,000 a year.

> **Cost:** New media can be expensive, especially when modernizing the technological infrastructure of whole schools or districts. The short-term cost can be daunting, despite the long-term costs of not implementing change–creating a generation of high school graduates unprepared for college and careers.

> **Professional development:** Simply acquiring technology does not make learning student centered. We must prepare teachers to employ new media to support student learning.

Finally, technologies are not good at the "emotional work" of the classroom, which is ultimately about building and enhancing relationships. Computers and online tools and programs are not equipped to do this profoundly human work. That responsibility lies in the hands, heart, and mind of the classroom teacher. What universally designed materials can do is to provide the supportive tools that enhance a teacher's ability to excel.

STATE OF THE ART

The education landscape is slowly beginning to shift toward embracing the framework of UDL as a basis for student-centered learning. Its proponents are laying the necessary groundwork, in the realms of public policy, state and district initiatives, market models, and classroom practices.

Ultimately, what will separate new curricula from old is that they will reflect a new ecology for learning. That new ecology will put students at the center of the learning environment. And all students will not only learn, each in their own way; they also will teach because every curriculum will not only teach, it will also learn. In so doing, we will create an optimal ecology for learning, one in which the paths to learning are rich and diverse enough for *all* our students.

ABOUT THE AUTHORS

David H. Rose, Ed.D., is a developmental neuropsychologist and educator whose primary focus is on the development of new technologies for learning. In 1984, Dr. Rose co-founded CAST, a nonprofit research and development organization whose mission is to improve education for all learners through innovative uses of modern multimedia technology and contemporary research in the cognitive neurosciences. He also teaches at the Harvard Graduate School of Education, where he has been on the faculty for nearly 30 years.

Jenna W. Gravel, Ed.M., is a doctoral student at the Harvard Graduate School of Education whose research interests focus on effective implementation of Universal Design for Learning (UDL) and the impact that this framework has on student learning. Prior to attending HGSE, she worked as a project manager and research associate at CAST, an education research and development organization. Before joining CAST, she worked as a middle school inclusion specialist as well as a staff assistant for an advocacy group for parents of children with disabilities.
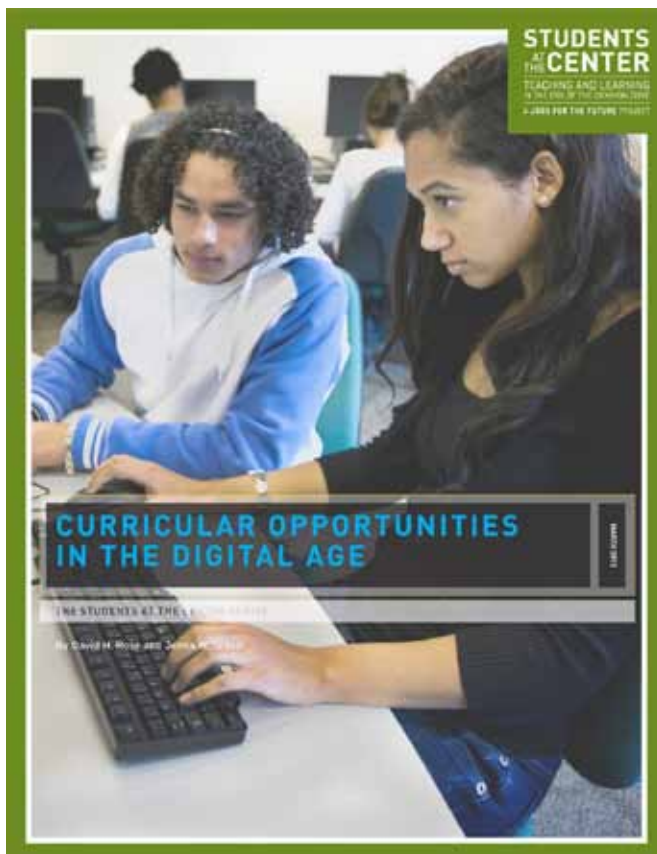
Curricular Opportunities in the Digital Age

This paper explores how new technologies can be used to design curricula that can be readily adapted to individual differences, providing a foundation for student-centered, rather than curriculum-centered, approaches to teaching and learning.

To download the full paper, go to www.studentsatthecenter.org

PERSONALIZATION IN SCHOOLS

By Susan Yonezawa, Larry McClure, and Makeba Jones

EXECUTIVE SUMMARY
THE EDITORS, *STUDENTS AT THE CENTER* SERIES

Thoughtful educators personalize schools every day—greeting students by name, offering extra academic help, checking in about serious family problems. Some go further, such as setting up specialized clubs or internships with local businesses. Such acts undoubtedly benefit their students, helping them feel connected to school and helping teachers and other school staff respond to student needs and interests. These are key tenets of student-centered approaches to learning.

Desite the best of intentions, however, most efforts to personalize schools fall short of their potential to make a major difference in the lives of young people. To evaluate formal attempts to personalize U.S. secondary education, Susan Yonezawa, Larry McClure, and Makeba Jones assessed the research evidence on personalization in terms of teacher-student relationships and their impact on students. The authors examined school reforms that have incorporated personalization, with a special focus on programs affecting low-income and minority students. They conclude that increasing personalization must become the sustained goal of a widespread organizational effort in order to significantly improve student achievement and emotional well-being.

The authors demonstrate that:

> Teacher-student relationships are central to personalization. They also lie at the heart of a variety of widespread reforms designed to support young people as students and as emerging adults.

> Positive relationships between youth and adults improve a range of student outcomes, including academic, behavioral, physical, and emotional well-being, particularly for low-income and minority youth.

> The evidence in support of personalization-oriented reforms is uneven. The most effective practices appear to be small schools, advisory programs, and like-minded reforms intent on improving youth-adult relationships.

> Structural reforms may not be enough to increase personalization in schools unless they focus on teaching and learning, as well as the thoughtful incorporation of improved curricula and pedagogy.

> Among the promising ways to increase personalization are multiple pathways approaches, programs involving careers as curriculum, work-linked learning, technology, mastery-based instruction, and community schools.

> In an era of declining resources, it is not clear that even highly promising efforts can be sustained. It would be wise to research their full costs and benefits—including both short- and long-term outcomes.

WHAT IS PERSONALIZATION?

Personalization is critical to creating and sustaining student-centered approaches to learning. Yonezawa, McClure, and Jones define it as the cultivation of a web of positive relationships—among adults and youth in classrooms, schools, and communities—to promote learning. The idea is that educators get to know their students well—not just their abilities and learning styles but also their interests and motivations—and they use this personal knowledge to design more effective individualized instruction and guidance and help students feel competent in and connected to the world. For the relationships to be useful, though, they must be reciprocal: Students must also come to know their teachers, to trust them and respect them.

The movement toward personalization is intended as an antidote to the widespread feelings of anonymity, irrelevance, and disengagement that adolescents report, especially in large, urban high schools. Personalization aims to stem the resulting academic, personal, and societal problems by engaging students in education, making schools more relevant to them, and feeding their need for support and connection.

THE BENEFITS

A growing body of research suggests that positive teacher-student relationships can help buffer young people against a host of problems, from disengagement in a specific academic subject, to smoking, drinking, or engaging in risky social behaviors. Research shows such relationships improve a range of academic, behavioral, physical, social, and emotional outcomes, particularly for low-income and minority students.

What characterizes high-quality relationships between educators and youth? Those who study teacher-student relationships generally agree that they are warmer and have lower levels of conflict. Warmth is reflected in teacher interest, praise, high expectations for student achievement, and a willingness to listen, among other characteristics. Conflict is reflected in coercive disciplinary practices, unwillingness to incorporate individual choice, and low expectations for student achievement, among other features.

Secondary students prefer and expect to work harder for teachers who balance control with caring, high-expectation approaches. Research associates improved attachment between secondary school teachers and students with higher standardized test scores, increased academic motivation, and lower rates of referral to special education. Adolescents who feel teachers are fair and caring are less likely to smoke, drink alcohol, abuse drugs, engage in sexual intercourse, or be involved in weapon-related violence.

For low-income and minority youth, research suggests that supportive teacher-student relationships are particularly important because of the disproportionate number of these young people who become alienated, disengaged, and drop out of high school.

LARGE-SCALE REFORMS

Many efforts to restructure secondary schools seek to enable teachers to know individual students better by spending more time with them over a longer period. Implementation has been sporadic, though, and the research evidence uneven. Nevertheless, advisory programs, alternative grade spans, and small school reforms all appear to hold promise.

ADVISORY PROGRAMS

The most common approach to personalizing high schools is to create advisory programs, which now exist in thousands of secondary schools. Typically, advisories are single classrooms of students, loosely connected with one another, who receive a variety of one-on-one supports from the teacher during the advisory period.

Advisory teachers often serve as quasi-counselors, providing tutoring or advice on such matters as course schedules, college applications, and career plans. Ideally, the advisory is a place where students feel they have at least one advocate on the school staff, an adult to whom they can turn whenever they need help. After the teens and the teachers get to know and trust each other, this advisory would also provide social and emotional support.

Research on advisories, as with much of the personalization field, is descriptive and lacks experimental peer-reviewed studies addressing effectiveness. The authors suggest that advisories are worth pursuing as an avenue to personalize schools because they are relatively inexpensive and are fairly well accepted in schools. However, maximizing their usefulness will remain challenging until research can offer guidance on how to design effective programs for specific populations.

ALTERNATIVE GRADE SPANS

Reconfiguration of the middle grades-to-high school transition is a popular structural reform strategy for personalizing schools. More and more schools span grades kindergarten through eighth grade or the fifth through eight grades, rather than starting in the sixth grade. Students benefit from fewer transitions between schools over the K-12 years or from more years at a single school. Proponents argue that adults can better connect with youth in the schools when cohorts remain together for longer.

Research suggests that students, particularly low-income, urban youth, have increased difficulty with traditional K-12 transitions following the fifth and ninth grades. Research shows that students who changed schools less often and transitioned to middle school earlier had greater academic gains than those in traditional configurations. More research is needed to determine which reforms make a substantial difference for which groups.

SMALL-SCHOOL REFORM

The purpose of small schools is to build up and enrich the connections of multiple adults to individual students. The small schools movement emerged from a body of solid research suggesting that smaller schools post better academic results, particularly for low-income students of color. Small schools can be brand new or they can be conversions formed by dividing large, comprehensive high schools into either small learning communities or multiple small high schools at the same physical site.

Small schools mark an important shift in thinking and practice regarding efforts to personalize high schools beyond individual student-teacher relationships. They operate from an institutional assumption that students

need to be served in a multilayered environment, where many adults and students form connections to provide academic, social, and emotional support, and where cohorts of students are small enough for educators to provide individualized instruction.

An important aspect of effective small schools is the greater opportunity for teacher-to-teacher collaboration. Often, teachers engage together ever day to analyze data, plan lessons, and discuss specific interventions to help struggling students.

Research shows that small schools appear particularly advantageous (compared to large, urban high schools) for low-income, minority youth. A large-scale, longitudinal study in New York City found that enrolling in a small school of one's choice significantly closes the achievement gap between low- and middle-income students, with the greatest benefits for low-income African-African males.

CLASSROOM AND SCHOOL PRACTICE

Instructional change often gets lost in the myriad challenges of implementing structural change, and altering instruction has proven far more difficult than implementing new structures like advisory programs or even whole new schools. The field now faces a preponderance of evidence that structural changes in secondary education are important but insufficient to creating more personalized instruction.

It is crucial to refocus on how the activities of teaching and learning—and the thoughtful incorporation of improved curricula and pedagogy—remain central to building personal relationships between teachers and students. New instructional reforms are emerging to increase personalization. Though as yet unproven, efforts to reshape curricula and instruction with an eye toward personalization are garnering attention and resources that make them worthy of examination.

CAREER CURRICULA

One aspect of interest in personalizing instruction is to connect curricula and pedagogy with students' career interests. While career academies have a long history and precede small-school reform, current career pathways reflect the growing interest in focusing on student choice and real-world applications that engage students and personalize learning. The rising costs of college going, the increasingly competitive nature of postsecondary admission, low postsecondary completion rates for low-income youth, and the economic recession have convinced many legislators, educators, students, and families that returning a career pathway option to high schools may help many students.

One example is the Career Academy Support Network at the University of California-Berkeley, which has been supporting efforts to reform high schools with a career focus for 40 years. The network reports that high school graduation rates are 10 percentage points higher for participants compared to statewide averages.

MULTIPLE PATHWAYS AND WORK-LINKED LEARNING

The Pathways to Prosperity Project at the Harvard Graduate School of Education champions new concepts such as dual enrollment, college and career readiness, and work-linked learning. Such initiatives are helping revive career and technical education as a viable option for educators seeking to individualize curricula for young people in ways that match their future occupational and economic interests.

These efforts are based on the belief that adolescents need not only a rigorous curriculum but also specific supports to aid the transition to adulthood. Workplace internships, career and college mentoring, and other programs within these initiatives help students start postsecondary certificate and credential programs while still in high school. Increasingly, they are seen as effective ways of personalizing education for many young people for whom a single-track, college preparatory system appear insufficient.

TECHNOLOGY

There is significant potential for technology to alter the landscape of individualized instruction. Proponents of technology suggest it can provide teachers and students with tools to individualize curricula, pedagogy, and assessments and at the same time increase engagement and decrease costs.

Imagine classrooms where every student has an iPad and can download text, video, and graphic information on a given topic. Students could become more active creators of their learning environment, and be more engaged in it and more motivated to achieve. However, research so far contains mixed outcomes. It also bears important warnings, especially that of low access to technology in impoverished communities.

MASTERY-BASED INSTRUCTION

Mastery-based instruction is part of discussions about how technology can lead to more personalization and individualized education plans for students. Rather than just delivering content, another role of the teacher in mastery-based instruction is to facilitate the learning of the students, each of whom could be working at a different level within a given content area. Ideally, schools could advance students according to mastery rather than seat

time or lesson completion. Technology could provide the means for frequent individual assessments and encourage students to progress at their own pace. Ultimately, students could graduate and move into postsecondary education (traditional or trade) as soon as they are ready.

COMMUNITY SCHOOLS

The "community schools movement"—sometimes called "wraparound reforms"—has gained strength, along with a growing understanding of poverty and its ill effects on the ability of the most at-risk students to succeed academically. Community schools build intensive support networks around impoverished youth and their communities in an effort to meet all of a student's needs that can affect learning. The idea is less about altering curricula or instruction and more about bolstering school partnerships with local social and health services agencies.

These efforts seek to strengthen adult-youth relationships across multiple domains of young people's lives, including home, peer circles, work, church, and schools. Providing a range of social, health, academic, and economic supports and resources can increase the likelihood of academic success as reflected by earning a high school diploma followed by a postsecondary credential or certificate that leads to gainful employment.

WHERE DO WE GO FROM HERE?

While robust evidence that personalization as characterized by positive teacher-student relationships helps students in a variety of ways, additional research is needed to determine which personalization strategies may be most successful.

Another immediate concern is the resource-intensive nature of many personalization efforts, which affects the outlook for maintaining such investments. In these difficult economic times, it is unclear whether the most promising reforms can be sustained. However, it would be valuable to take a broader view of expenses and benefits—including outputs as well as inputs—to estimate true long-term costs to the nation.

Setting aside the economic realities of the present day, a larger challenge remains: developing a convincing, nuanced body of research and practice on efforts to personalize secondary education. This requires a close examination of educational environments—and in particular teaching and learning—both inside and outside traditional school and classroom contexts. Our charge is to better understand the ways in which educators and students interact to making classroom, school, and community settings in which youth learn and live engaging places.

ABOUT THE AUTHORS

Susan Yonezawa, Ph.D., is an associate project research scientist with the University of California, San Diego's Center for Research in Educational Equity, Assessment and Teaching Excellence (CREATE) where she is also associate director. She conducts design-based research on student voice, youth engagement, and equity-minded secondary school reforms. She has published in numerous journals including the *American Educational Research Journal*, *Educational Researcher*, *Journal of Educational Change*, and *Urban Education*.

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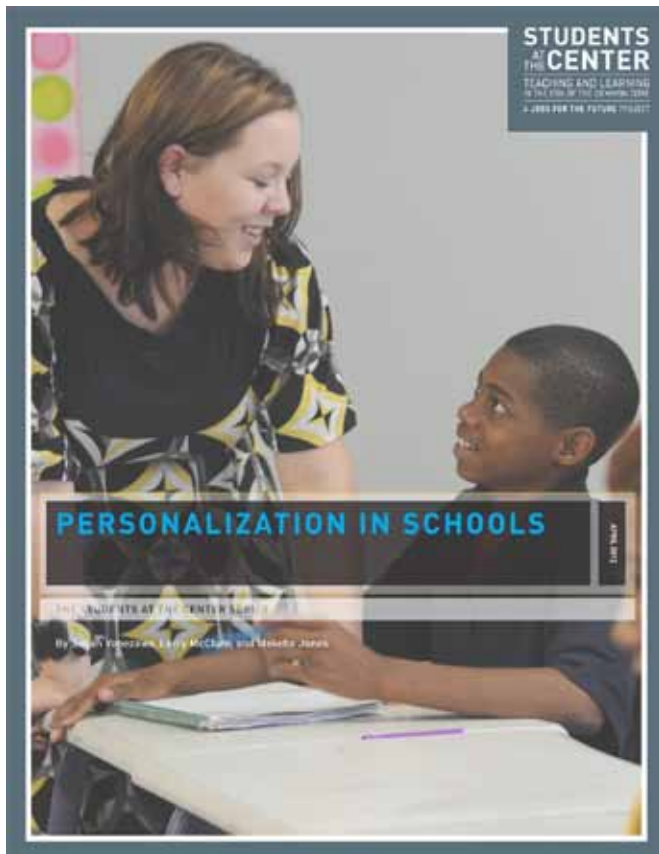
Personalization in Schools

This paper examines the connections between strong adult-youth relationships in school and increased student engagement and academic performance, particularly for low-income and underserved students.

To download the full paper, go to www.studentsatthecenter.org

ASSESSING LEARNING

By Heidi Andrade, Kristen Huff, and Georgia Brooke

EXECUTIVE SUMMARY
THE EDITORS, *STUDENTS AT THE CENTER* SERIES

Assessing student learning often promotes anxiety among students—and among teachers—not only because they worry about the results but because the items tested do not seem to reflect what students have learned. But when assessment is student centered, it can promote learning and even motivation. Moreover, assessment is essential to student-centered approaches to learning, which value differentiation, active engagement, and self-management as critical to learning.

To paint a picture of what student-centered assessment can be, Heidi Andrade, Kristen Huff, and Georgia Brooke have examined the full range of assessment practices, including classroom-based, local, state, and national assessments. They conclude that a blend of practices, each with different purposes, advantages, and limitations, can create a balanced, student-centered assessment system, with great benefits for efforts to prepare students for college and careers. The authors pay particular attention to large-scale, standardized tests, which are ubiquitous in U.S. schools, and to computer-based assessments, which hold special promise in a balanced system.

Andrade, Huff, and Brooke observe that:

> Student-centered assessment is individualized, It is focused on learning and growth, motivating, amenable to students regulating their own learning, and informative and useful to a variety of audiences.

> No single type of assessment can inform learning and instruction and simultaneously aid policy decisions. Student-centered assessment should be part of a balanced system of formative, interim, and summative assessments—both formal and informal.

> A variety of classroom-based assessments are associated with significant gains in student learning and achievement. These include self- and peer assessments, portfolios, assessments using new technologies, and formative uses of summative tests.

> Large-scale tests can provide useful feedback to students, teachers, and others, particularly when tests that are based on theories of learning, sensitive to the context in which they are administered, and provide instructionally relevant reports.

> Schools and districts across the nation report impressive gains in student achievement via teacher-created interim assessments, which directly measure the curriculum enacted in classrooms and foster professional collaboration.

> Modern assessment technologies hold great promise for their ability to give immediate feedback to each student and because teachers can respond to individual learning needs with greater speed, frequency, focus, and flexibility.

A DEFINITION OF STUDENT-CENTERED ASSESSMENT

Student-centered assessment has defining qualities:

It is **individualized**, focusing on each student's strengths, needs, and interests. This is as essential as it is obvious. It involves differentiating learning targets, assignments, and tasks; providing focused feedback on learning alone or in groups; and adjusting teaching and learning processes as needed.

It **promotes learning and growth**. The goals go far beyond measuring and reporting learning (or lack thereof). Student-centered assessment advances learning by providing useful feedback about what students need to do to progress toward the target.

Key for college and career success, student-centered assessment **actively engages young people in the regulation of their own learning**. Students set individual goals, monitor their own progress, and figure out how to fill gaps.

Student-centered assessment is **motivating**. Recent studies show that formative assessment–particularly detailed, task-specific comments on student work–can activate student interest and result in better performance.

To support learning, student-centered assessment is **useful to a variety of audiences**–young people, teachers, administrators, parents, districts, and states. Despite the availability of reams of data, the U.S. education system still does a poor job of using assessment information to adapt curricula and instruction.

Student-centered assessment shares many qualities with any good assessment. For example, it articulates developmentally appropriate learning targets, and it provides feedback to students, teachers, districts, and states about how to deepen learning. It is also valid, reliable, practicable, and efficient.

THE IMPORTANCE OF BALANCED ASSESSMENT

No single type of assessment can inform classroom practice as well as school, district, and high-level policy decisions. Therefore, student-centered assessment requires a balanced system of formative, interim, and summative assessments that, taken together, provide the detailed information educators and other stakeholders need. Such a system may include everything from informal observations of student work to standardized tests.

Formative assessments are the ongoing, minute-by-minute, day-by-day classroom assessments administered in the course of a unit of instruction. The intent is to identify individual strengths and weaknesses, assist educators in planning subsequent instruction, and aid students in guiding their own learning, revising their work, and developing self-evaluation skills.

Interim and summative assessments are more formalized processes of measuring student achievement through the school year. The chief goal of interim assessments is to provide information to educators and policymakers, who can adjust curricula and instruction as needed. The primary purpose of summative assessments–which are often standardized and typically administered at the end of a unit of instruction, semester, or year–is to categorize performance of a student or education system to inform accountability processes and decisions about grades, graduation, or retention.

Ultimately, a system using all three types of assessment, created both inside and outside the classroom, is needed to support student-centered approaches to learning.

STUDENT-CENTERED ASSESSMENT PRACTICES

While all assessment processes have some student-centered qualities, only a few meet all the characteristics of student-centered assessment. Hence, the need for a balanced

TABLE 1
STUDENT-CENTERED QUALITIES OF SELECT ASSESSMENT PROCESSES

	INDIVIDUALIZED	FOCUSED ON LEARNING AND GROWTH	MOTIVATING	STUDENT SELF-REGULATION	INFORMATIVE TO A VARIETY OF AUDIENCES
FORMATIVE					
Self-assessment	●	●	●	●	
Peer assessment	●	●	●	●	●
Portfolios	●	●	●	●	●
Tests		●	●	●	●
INTERIM					
Criterion-referenced tests		●			●
SUMMATIVE					
Exhibitions	●	●	●	●	●
Tests based on learning progression		●			●
Diagnostic items		●			●
Large-scale tests					●

approach. Generally, formative assessment tends to be more student-centered than interim and summative assessment (*except for end-of-year exhibitions of student work: see box*). The table presents an overview of select assessment processes, along with the "student centeredness" of each.

Despite the need to use different types of assessment for different purposes, when it comes to the critical work of improving student outcomes, research has shown that formative, classroom-based assessments are associated with significant gains in learning and achievement. These include self-assessments, peer assessments, portfolios, and formative uses of summative tests.

SELF-ASSESSMENT

Self-assessment is feedback for oneself from oneself. The point is to help students identify their own areas of strengths and weaknesses, take responsibility for their performance, monitor their achievement, and improve their learning. Self-assessment is not a matter of students determining their own grades. Rather, it involves articulating goals, checking progress, and revising one's work. Research suggests this can boost achievement and autonomy in a range of subjects.

A common self-assessment tool is a one- or two-page list of criteria for a specific assignment, with descriptions of varying levels of performance. Using this rubric, each student compares her or his own work to the expectations and makes a plan for improvement. Students generally react well to self-assessment but need support and practice to reap the full benefits.

PEER ASSESSMENT

With peer assessment, learners provide feedback to one another. Like self-assessment, it is available more quickly and in greater volume than teacher feedback. Students can help one another identify strengths and weaknesses in the quality of a product or performance—and target areas for improvement. Research suggests that peer assessment can improve the quality and effectiveness of learning across grade levels, particularly in writing. Furthermore, both the student being assessed and the assessor benefit from the process.

PORTFOLIOS

An academic portfolio is a collection of one student's work. It typically consists of physical artifacts presented in a deliberate order, assembled in a folder or binder or on a computer, incorporating audio, video, graphics, and text.

The student takes part in the construction of the portfolio, and its contents include his or her reflections. Some portfolios showcase a student's best work; others trace progress from novice to mastery.

The portfolio scaffolds self-regulated learning and provides nuanced information about a student's knowledge, motivations, and needs. For example, a writing process portfolio includes several successive drafts and the students' comments on each. Research suggests that portfolios are best used formatively, for classroom assessment, rather than for summative purposes.

FORMATIVE USES OF SUMMATIVE TESTS

Traditionally, tests come at the end of a unit of study; teachers use them summatively to determine grades. In contrast, formative uses of summative tests involve two testing events: one in the middle of a unit (or even during a lesson on a concept) and one following further instruction. The results of the first test are used formatively, while the results of the second test are used summatively.

Formative uses of summative testing are individualized: they provide information about what each student does and does not know, at least in terms of what was tested. This approach to testing is designed with learning and growth in mind. The explicit goal of the first test is to activate learning about the content of the second test. It is not hearing the correct answers to the test that makes formative use of testing work. Rather, it is the hard thinking that happens in between the tests that matters.

Research shows that this process—called mastery learning—is related to learning gains, especially for struggling students, and has positive effects on student attitudes toward course content.

EXHIBITIONS

Exhibitions are public demonstrations of mastery that occur at culminating moments (e.g., the end of a unit of study; graduation). Their purpose is to support sustained, personalized learning while assuring commitment, engagement, and high-level intellectual achievement aligned with established standards.

Exhibitions exemplify the characteristics of student-centered assessment. They are individualized to student interests. They involve personalized, ongoing feedback from diverse sources before the exhibition. They actively engage students in regulating learning by requiring them to set goals and seek feedback. Because the audience for exhibitions typically includes practicing experts, they provide an authentic, real-world task that can motivate students to do well. By definition, exhibitions provide information about student learning to students, teachers, parents, administrators, and community members.

LARGE-SCALE ASSESSMENT

Large-scale assessments–those that states use for K-12 accountability and those that measure performance based on national norms–tend to be less student-centered than any of the processes discussed here. However, they are ubiquitous in U.S. schools and unlikely to go away any time soon. Policymakers use the information to compare performance within states and nationally. Local and policymakers analyze the data and often use it to determine where to allocate resources and what kinds of educational programs have the most success with particular groups.

On a positive note, recent advances in large-scale tests suggest they can do more than measure and report on a narrow band of student knowledge and skills. Large-scale assessment can provide useful feedback to students, teachers, and policymakers when they are: based on theories of learning; address the educational context of a wide array of students; and provide instructionally relevant score reports.

For example, recent research suggests that K-12 accountability assessments could enhance student learning by providing test takers with elaborated, task-level feedback. Such an augmentation to large-scale tests would go a long way toward making them more effective in promoting learning and growth.

TEACHER-CREATED, CRITERION-REFERENCED ASSESSMENTS

Schools and districts across the nation are reporting impressive gains in student achievement through the use of criterion-referenced assessments that teachers create. Teams of teachers–within and across schools–in particular grades and subject areas collaborate to design questions that directly measure the curriculum enacted in their classrooms. The teachers use the same assessments on an interim basis throughout the school year (usually about every six weeks). They get together to discuss the results at length and share pedagogical approaches to helping students succeed. The key to the success of these efforts is that teachers work together to develop the tests and discuss the results, and then adjust their pedagogy accordingly when they return to their classrooms.

ASSESSMENT TECHNOLOGIES

Modern assessment technologies hold great promise for student-centered approaches to learning. They provide immediate feedback and enable teachers to respond to individual learning needs with greater speed, frequency, focus, and flexibility.

Key features of student-centered assessment technologies include: systematic monitoring of student progress to inform instructional decisions; the identification of misconceptions that may interfere with student learning; rapid feedback to students, teachers, and others; and information about student learning needs during instruction.

Computer-based assessment software integrates the management of learning (e.g., organizing student assignments, assessments, and performance), curricular resources, embedded assessments, and detailed student-level and aggregate reporting of strengths and weaknesses. Examples include DreamBox Learning, Time To Know, Wowzers, Carnegie Learning, and WriteToLearn. While some products, like DreamBox Learning and Time To Know, integrate instruction and assessment into one platform, others such as WriteToLearn focus just on assessment. Continued research on the effectiveness of assessment technologies in student-centered learning environments would be valuable, yet there is already some information on their value.

WriteToLearn is an example with strong research support. WriteToLearn promotes reading comprehension and writing skills by providing students with immediate, individualized feedback. Designed for grades 4 through 12, it consists of Summary Street, where students read and summarize articles or book excerpts, and the Intelligent Essay Assessor, where students write topic-prompted essays. One study found a positive relationship between the use of Summary Street and student summary scores after just two weeks. It also found that students spend significantly more time generating summaries than do students not using the program, suggesting it may promote motivation and engagement. Another study found that eighth graders using Summary Street have significantly higher comprehension scores and better writing skills than students who do not use the program.

ASSESSING THE ASSESSMENTS

It is clear that a balanced system of formative, interim, and summative assessments can support student-centered assessment and learning. Yet even an exquisitely balanced assessment system would present challenges. For one thing, the sheer quantity of assessment data threatens to be overwhelming. Even as new assessment processes are created, educators must work to ensure they are useful to and used by the appropriate audiences–students, teachers, schools, districts, and policymakers alike. It is also critical to continually assess the assessments to make sure that advances in design–and their implementation–are as student centered as possible.

ABOUT THE AUTHORS

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Kristen Huff, Ed.D., is the Senior Fellow for Assessment at the Regents Research Fund. Her main research interest is integrating evidence-centered design theory and practice into large-scale assessments to ensure that what is valued in student learning is measured on exams and communicated through instructionally-relevant score reports.

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Assessing Learning

Ideally, schools would implement a balanced system of formative, interim, and summative assessments that together inform learning, instruction, decision making, and policy. This paper unpacks the components of such a system.

To download the full paper, go to www.studentsatthecenter.org

CHANGING SCHOOL DISTRICT PRACTICES

By Ben Levin, Amanda Datnow, and Nathalie Carrier

EXECUTIVE SUMMARY
THE EDITORS, *STUDENTS AT THE CENTER* SERIES

School districts seeking to prepare more students for college and careers by implementing student-centered approaches to learning face significant challenges in their efforts to move beyond the status quo. Any educational reform effort encounters barriers, but the difficulties inherent in changing the traditional nature of teaching and the culture of classrooms present particular problems. Understanding these dynamics at the outset of planning for districtwide change will aid efforts to put student needs, motivations, and interests at the center of educational practice.

What would it take to move districts toward student-centered learning? And how much of this work is occurring in U.S. school systems? While there is evidence of student-centered practices in some schools and classrooms, student-centered approaches are not predominant, especially system-wide.

To understand the work that school districts are doing to support student-centered learning, Ben Levin, Amanda Datnow, and Nathalie Carrier reviewed research about high-performing school districts, and examined the scope of commonly defined student-centered practices in school districts and charter schools. They observed that:

> School districts are essential actors in any education reform and will have to play a vital role in any efforts to expand student-centered approaches to learning. Without district leadership of student-centered reform initiatives, widespread implementation is likely to fail.

> System-wide implementation of student-centered approaches presents particular problems because it aims to change longstanding traditions of teacher practice and classroom culture.

> While there is little direct research evidence of student-centered approaches to learning across high-performing districts, the practices and processes of these districts are pertinent to such innovative approaches.

> Districts do not appear to be deeply involved in implementing student-centered practices. Most examples of district engagement are programmatic and tailored to serve particular groups of students, rather than intended for all of a system's students.

> In any effort to implement student-centered approaches, districts will need to assess policy and administrative requirements and state accountability measures that impede or support such approaches.

> A strong, districtwide student-centered agenda would likely include implementing special programs and/or schools as well as working simultaneously to change practice in all schools and for all students.

EXPANDING STUDENT-CENTERED APPROACHES REQUIRES DISTRICT LEADERSHIP

Whether viewed as bureaucratic barriers to innovation or influential organizations that can expand effective educational practice, school districts remain essential actors in any educational reform effort. Despite debate over how they fulfill their role, the fact remains for now and the foreseeable future that districts will continue to be the dominant local governance structure for U.S. schooling.

School districts play crucial roles in orienting systems toward their goals, providing instructional leadership, establishing policy coherence, and maintaining a focus on equity. Districts also carry out many important logistical tasks: they may hire and assign teachers and principals, manage facilities, decide the location of school programs, assign students to schools, and manage a large portion of budgets. Through these actions, they help shape school cultures and priorities. They also serve as a key connection between communities and their schools.

Given their leadership responsibilities and decision-making authority, districts will play a vital role in any effort to provide and extend the principles of student-centered approaches to learning across a system. Without widespread district support, student-centered practices will remain a marginal activity; they will have no chance to gain the traction they need to make a difference in the lives and prospects of youth across the country.

IT IS NOT EASY FOR DISTRICTS TO CHANGE TEACHER PRACTICE AND CLASSROOM CULTURE

Educational reform of the depth and breadth required to implement student-centered approaches to learning will require school systems to undergo monumental changes in structure, policy, and culture. Among the most significant, districts will need to support challenges to longstanding ways that schools and classrooms operate—the way teachers teach, students learn, and outcomes are assessed; the hours of the school day; and the location of school programs. Underlying all else, school districts will need to understand and foster fundamental change in the relationships between teachers and students. Teachers will focus on understanding not only their students' learning styles but also their interests, anxieties, and motivations. Students will take much more responsibility for what and how they learn.

Some of these practices may collide with broader systemic rules and state and national regulations, such as assessment and accountability mechanisms, graduation requirements, financing guidelines, and collective bargaining laws. They also may conflict with the philosophies of teachers or the beliefs of parents and community members. It will be the job of districts to align stakeholders at all levels of the school system to these new approaches and mobilize political and community support.

KNOWLEDGE ABOUT HOW DISTRICTS SUPPORT REFORMS CAN INFORM IMPLEMENTATION OF STUDENT-CENTERED APPROACHES

The roles that effective school districts play in supporting educational reform of any kind are complex and interrelated. Drawing from recent research on high-performing districts—those that have improved student outcomes—a number of system practices and processes are pertinent in supporting innovative approaches in general and student-centered approaches in particular. These include: a clear leadership focus on improving student learning; a commitment to equity and excellence; combining top-down support with bottom-up innovation; learning-focused partnerships

between districts and schools; data-informed decision making; capacity building at all levels; and productive partnerships with local and national organizations.

One of the most important ways a district can support educational reform is establishing a clear leadership focus on continuously improving student learning. Ideally, this would translate into a shared system-wide vision focused on closing achievement gaps and bringing all students to high standards. Practically, it requires aligning resources, administrative efforts, and policy around this vision.

For expanding student-centered approaches to learning, the specifics would include such actions as: endorsing a curriculum with instruction that is more project-based than textbook-driven; giving teachers the flexibility to make adjustments that suit students' needs and interests; and establishing measures of achievement that are broader than traditional tests. Effective instructional leadership is critical because districts must help schools and staff develop the capacity to teach in new ways. This would include more than traditional professional development. Often, it is important to make teaching practices more public and transparent; teachers will need to open their classrooms and their minds to constructive feedback from peers, instructional coaches, and other observers.

At the same time, teacher support for reform effort is critical. District leaders would be wise to consider how student-centered practices can be structured—and introduced—to genuinely motivate, rather than alienate, the teaching staff. Likewise, effective school districts balance top-down central management with flexibility and autonomy for schools.

The relationship among all of these factors is critical. For example, when district leaders articulate clear goals for reform and a strong theory of change, staff are more likely to coordinate resources throughout the system to support new practices.

SCHOOL DISTRICTS ARE IMPLEMENTING STUDENT-CENTERED PRACTICE MOSTLY IN SPECIALIZED PROGRAMS OR AT INDIVIDUAL SCHOOLS

There has been little research on the extent of district efforts to establish student-centered practices to improve student achievement or on how districts should go about doing this work. A review of websites of selected "high-performing" districts and charter management organizations (CMOs) begins to fill this gap, identifying the ways in which their activities reflect elements of student-centered learning.

The research reveals that student-centered learning is still in its infancy as an educational model in the United States. Neither districts nor CMOs appear to be deeply involved in implementing student-centered approaches. Virtually every district or organization has some elements consistent with the concept of student-centered learning, but many elements of student-centered approaches are not evident at all.

Student-centered practices most often employed by districts tend to be programmatic and, in some sense, peripheral to the daily lives of teachers and students across all schools in the system. The review found many initiatives that appear to embody aspects of student-centered learning, rather than supporting system-wide changes in the daily cultures of schools, such as changing relations between teachers and students or modifying curriculum to meet student interests and choices. Districts are more likely to create programs for distinct populations or purposes that reach only a small proportion of students.

The review did find patterns in the kinds of approaches utilized. Common approaches include: dual-credit and early college programs; district-supported virtual schools; district-supported specialty schools; community-district partnerships; pilot programs; districtwide curriculum-specific initiatives and programs; school reconstruction projects; and choice and admission processes.

One might expect to find evidence of more student-centered learning approaches in CMOs because they provide alternative educational models to those provided by districts. However, the review did not always find this to be the case. As with districts, few of the charter programs reviewed provide educational programs that fundamentally disrupt "industrial" notions of classroom culture and learning.

Examples of significant CMO practices include: small class sizes, small schools, and personalized designs; curriculum-specific programs; mandatory parent involvement; afterschool programming and internships; extended school day; alternative teacher induction; college-bound support; no tracking; and specific instructional strategies.

SCHOOL DISTRICTS MUST BE STRATEGIC AND DELIBERATIVE IN REFORM EFFORTS AND CONSIDER FULL RANGE OF STUDENT-CENTERED OPTIONS AND EVIDENCE

Districts face many challenges as they seek to implement student-centered approaches to learning—whether in a single program or districtwide. First there are state and district policies and politics that can constrain change—teacher contracts, accountability measures, administrative requirements, and views of community stakeholders. In addition, before moving ahead, districts should examine a range of student-centered options, from charter schools, to virtual schools, to dual enrollment programs, and others. District leaders would be wise to consider the rationale for each practice and the range of choices overall, as well as the evidence base for each. Few districts appear to have an overall strategy for selecting student-centered alternatives to teaching and learning. Instead, they appear to adopt them one at a time, usually as someone thinks a particular model is a good idea or perhaps as internal or external pressures give rise to certain programs.

Among the key questions to answer regarding selection of implementing particular programs are: Which students would benefit? How would the programs or practices improve outcomes? What is the evidence that they will work? Then there are a host of logistical questions: How many students will participate? Where will programs be located, how will they be funded, and how will they be staffed? What will be the measures of success?

Various features of student-centered learning approaches may distract from or even conflict with one another. For example, efforts to remove barriers of time and space actually may make it harder for teachers to get to know students well, while a strong emphasis on good student-teacher relations may militate against relaxing rules on attendance. Opening up what counts as learning to, say, community or postsecondary study may make it harder to build strong communities inside a school. Providing more student choice may inadvertently increase racial and economic segregation. Choices will have to be made about which elements of student-centered learning will be prioritized.

Even after this long list of internal considerations, districts face state and federal policy issues, including graduation requirements, accountability mandates, funding provisions, and equity considerations.

For implementing student-centered practices districtwide, there needs to be system-wide understanding of the model and its goals, clarity of how these approaches specifically relate to each teacher's classroom practice, training opportunities for staff to gain the skills to be effective, and, ideally, low turnover at the district's highest levels so that system priorities do not change in the middle of the process.

A STRONG EFFORT TO IMPLEMENT STUDENT-CENTERED APPROACHES TO LEARNING REQUIRES BOTH NEW SPECIALIZED PROGRAMS AND SYSTEM-WIDE CHANGE

The right combination of student-centered approaches to teaching and learning for any given district depends on a variety of demographic and system factors, including population, geography, facilities, resources, public support, and opportunities for partnerships with outside organizations.

Given the challenges of implementing student-centered approaches to learning throughout entire school districts, a strong effort to adopt such approaches should probably combine special programs or schools with efforts to change practice in all schools and for all students.

To reach most students in a district will require comprehensive changes in teaching practice. Focusing only on innovative or special programs seems likely to leave large numbers of students unaffected. However, establishing specialized schools or programs also plays an important role. New options can provide good alternative opportunities for particular groups of students whose needs otherwise are not being met. In addition, this approach may be a way to begin to provide student-centered approaches in a district that is not ready for broader change and a place to start exploring student-centered strategies before committing to comprehensive changes.

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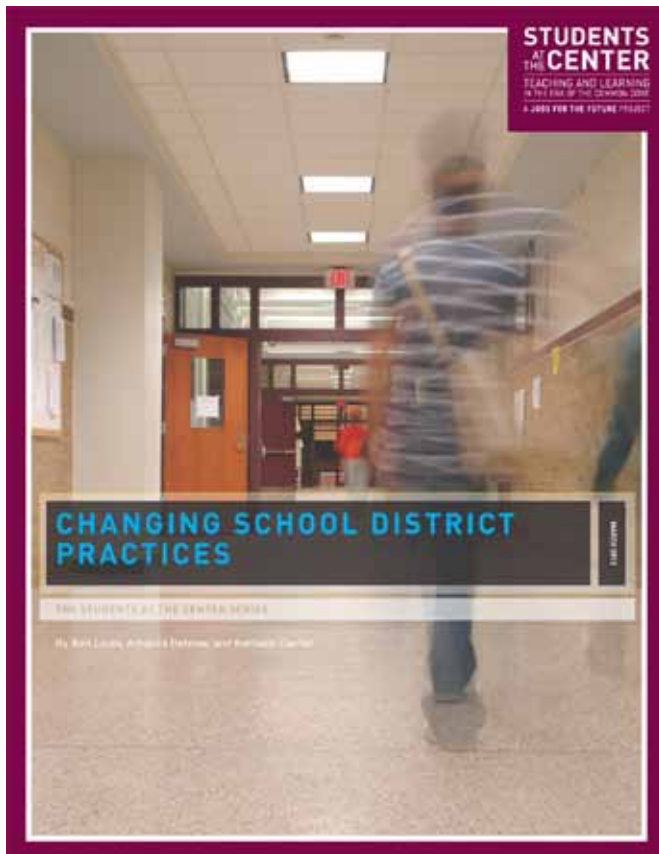
Changing School District Practices

If student-centered learning methods are to improve student achievement, school districts will need to reorganize in support of this result. This paper reviews current district practice and explores strategies for supporting system-wide student-centered approaches.

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