Highlights for District and School Leaders

English learners (ELs) comprise a diverse and talented pool of learners who bring valuable perspectives and resources to science, technology, engineering, and mathematics (STEM) that are born out of their experiences in their home languages, home and communities, and STEM schooling in other countries. Yet, these students lack access to rigorous STEM learning opportunities, in part due to incorrect assumptions that English proficiency is a prerequisite for students to meaningfully engage with STEM content learning.

English Learners in STEM Subjects: Transforming Classrooms, Schools, and Lives (2018), a report from the National Academies of Sciences, Engineering, and Medicine, emphasizes the importance of teaching language and STEM content in an interconnected way and identifies factors that affect ELs' access to rigorous, grade-appropriate STEM content learning opportunities and their success in STEM. Organizing schools and equipping teachers so that all students, including ELs, have opportunities to reach their full potential in STEM requires changes in classrooms and schools. This brief highlights information and recommendations from the report that are relevant to district and school leaders: Superintendent, chief academic officers, school/board of education members, and principals.

Policies at the federal, state, and local levels can either facilitate ELs' opportunities in STEM or constrain teaching and learning in ways that are detrimental. The **capacity building needed for facilitation not only includes allocating and implementing resources appropriately, but also examining the broader policies with concerted efforts to shift them**. The report outlines three components of continuous improvement efforts that can facilitate systemic transformation by districts and schools: **organizational culture, educators' capability, and policy and management**.

ORGANIZATIONAL CULTURE

Organizational culture encompasses local norms, routines, and practices that shape district and school culture as well as expectations for educator professionalism, collaboration, and reflection. **Establishing an organizational culture that supports the success of ELs in STEM requires attention to district and school leadership, collaboration, data-informed decision making, and community and family engagement**.

District and school leadership. This includes EL-focused central office leaders elevated to positions that involve them in cabinet decisions related to instructional priorities and human resources development and deployment. Additionally, district and school leaders should promote system-wide integration of language and content learning across instruction, curriculum, assessment, professional learning, and policies for categorization of ELs.

Culture of collaboration. District and school leaders who are working to promote the success of ELs should establish a culture of collaborative problem solving, experimentation, and learning. This includes developing peer networks across school systems in which leaders identify, analyze, and respond effectively to policy and practice issues; engage in information exchange and research that support their professional learning and de-

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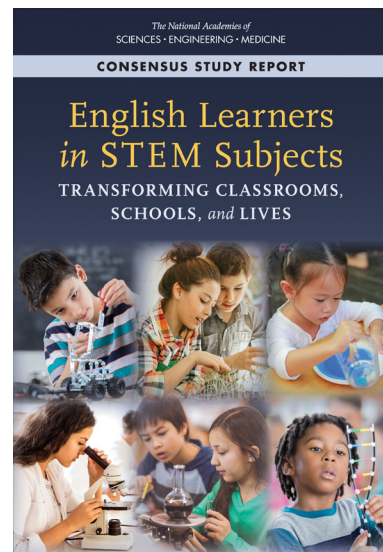
velopment; and implement system-wide changes to policies, programs, and practices that transform STEM learning for ELs.

Data informed decision-making. Leaders should collect and analyze a range of data related to achievement, program quality, and teacher quality to identify policies and practices that are either stalling or generating success for ELs. By looking at data specifically pertaining to ELs' access to STEM coursework and content, leaders at all levels of administration are better equipped to make data-driven decisions related to teaching ELs in STEM. Equity audits are a promising tool to help leaders ensure that all students have access to high-quality learning opportunities. These can include qualitative data collected through classroom observations, which can inform decisions about where and for whom (e.g., recently arrived, long-term, or reclassified ELs) interventions are needed.

Community and family engagement. Partnerships with intermediary organizations in communities—such as museums, businesses, industry, professional organizations, and universities—can also facilitate success in STEM for ELs. These external partnerships can create a rich ecosystem of STEM learning for educators, students, and families, especially when they are purposefully selected and designed to improve the existing practices at the school. In addition, successful partnerships focused on STEM learning for ELs typically have a district-based coordinator who establishes relationships with intermediary organizations and works with them to develop activities that introduce and deepen students' and families' understandings of STEM.

FIGURE Components of continuous improvement efforts.

EDUCATOR CAPABILITY

Educator capability refers to the beliefs and expertise of educators that influence their ability to implement curriculum, strategies, and other practices. **Building educator capability to teach ELs is driven by a clear instructional vision that is developed by an EL-focused leadership team; grounded in principles of diversity, equity, and inclusion; and has articulated goals for language and content integration that are aligned to rigorous standards.**

Instructional vision and framework. To develop a shared instructional vision, district leaders should provide the time and space for leadership teams to engage in capacity development, planning, and a variety of learning experiences that strengthen their understandings of ELs, their experiences in schools, and their success in STEM subjects. Furthermore, the visioning process is critical for developing an instructional framework that guides district-wide efforts to transform STEM learning for ELs. This instructional framework should emphasize three principles—opportunity to learn, asset orientation, and student autonomy—;it should also reflect a coherent language development approach designed to provide ELs with opportunities to develop content area knowledge, analytical practices, and discipline-specific academic language simultaneously.

Professional learning. District leadership can also work with EL specialists to provide job-embedded teacher professional development focused on develooping teachers' knowledge and skills related to facilitating academic conversations in classrooms. All teachers would benefit from professional development opportunities that attend to explicit integration of STEM content and disciplinary language. Yet there are likely to be distinct professional learning needs that differ for elementary and secondary teachers. Elementary teachers may need more support for learning STEM content, while secondary STEM teachers may require more exposure to instructional strategies and resources. But regardless of specific needs, deliberate attention to building educator capability is required for improvement efforts that provide equitable STEM learning opportunities for ELs to be taken up in a widespread manner.
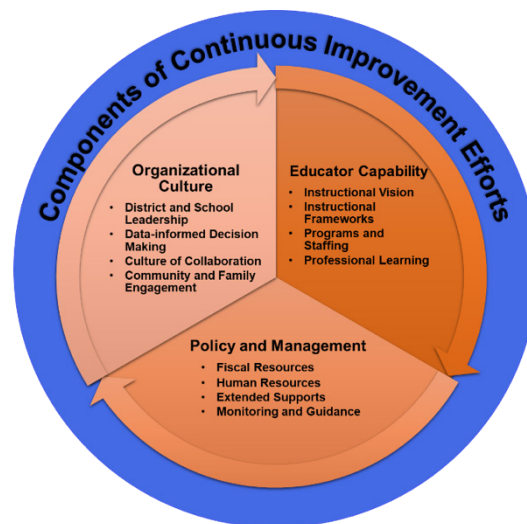
POLICY AND MANAGEMENT

Integrating STEM content and English language learning across systems may require the creation of new policies and practices related to curriculum development, materials selection, assessment, instruction, staffing, and professional development.

Fiscal and human resources. District and school leaders may need to adjust the allocation of fiscal resources in order to hire and retain educators with appropriate credentials in STEM content and English as a Second Language (ESL) or ELD, or those with bilingual skills. Alternatively, funds might be used to augment the skills of existing staff by offering ESL certificate courses to teachers who can then deliver EL-focused professional development to others in the district, including paraprofessionals. Although the allocation of fiscal resources for EL STEM education varies within and between school districts, research points to the value of blending district and school involvement in resource allocation and decision making. For instance, positive gains for ELs in STEM are associated with aligning fiscal and human resources. Therefore, **district and school leaders should ensure that all policies align to the instructional vision and framework for STEM learning for ELs, and then allocate fiscal and human resources and extended supports, appropriately.**

Monitoring and guidelines. Plans for monitoring and documenting progress, communicating the impact of new policies and practices, and providing guidance for continuous improvement should be developed and implemented. This work is typically facilitated by an oversight committee made up of district leadership and critical community leaders. The oversight committee engages in data collection and analysis to monitor district and school progress in facilitating ELs' access to and progress in STEM, and offers guidance on program design and redesign, staffing, professional development, and resource allocation. This reflects a shift from a focus on compliance to monitoring and support.

RECOMMENDATIONS

The report offers a set of recommendations to guide the efforts of policymakers, state, district, and school leaders, as well as educators, as they work collaboratively to support ELs' learning in STEM subjects. Below are the key recommendations that are specific to district and school leaders.

RECOMMENDATION 1: Evaluate current policies, approaches, and resources that have the potential to negatively affect ELs' access to STEM learning opportunities, including classification and reclassification, course-taking, classroom instruction, program models offered, professional development, staffing, and fiscal resources, etc.

- Districts should examine the policies and procedures that are in place for consistently implementing state procedures/criteria for classifying/reclassifying ELs.

- District leaders and school personnel should examine (a) the program models and placement of ELs in STEM courses with particular attention to grade bands as well as issues associated with overrepresentation of ELs in remedial courses, (b) preparation of STEM teachers with attention to schools with large EL populations, (c) the opportunities for teacher collaboration and professional development, and (d) the distribution of financial and human resources.

- Schools should evaluate ELs' success in STEM classes, the quality of STEM classroom instruction and the positioning of ELs in the classroom, the qualifications of teachers hired, the professional development opportunities offered to teachers, and the resources (e.g., time and space) allocated to STEM learning.

RECOMMENDATION 2: Develop a high-quality framework to identify and remove barriers to ELs' participation in rigorous STEM learning opportunities.

- District and school leaders should identify and enact norms of shared responsibility for success of ELs in STEM both within the district central office and within schools, developed by teams of district and school leaders associated with STEM and ELD/ESL education.

- Leaders in states, districts, and schools should continuously evaluate, monitor, and refine policies to ensure that ELs' STEM learning outcomes are comparable to their never-EL peers.

RECOMMENDATION 5: Encourage and facilitate engagement with stakeholders in ELs' local environment to support STEM learning.

- Schools and districts should reach out to families and caregivers to help them understand the available instructional programs in STEM and the different academic and occupational opportunities related to STEM, including what resources might be available in the community.
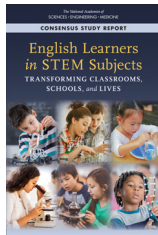
English Learners in STEM Subjects: Transforming Classrooms, Schools, and Lives **(2018)**
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