Opportunity Structures for Preparation and Inspiration (OSPrI):
Case Studies of 8 "Exemplar"
Inclusive STEM-focused High Schools

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Two vexing policy questions stand out in the U.S. and in countries around the world:

- How do we produce more students with strong preparation in STEM disciplines and the habits of mind vital for a 21st-century workforce?

- What can be done to close widening income and social mobility gaps?

One answer to both questions: Inclusive STEM High Schools (ISHSs) because they provide

Opportunity Structures

For students

STEM-capable graduates

Social mobility

Economic prosperity

Opportunity to learn

For communities

What is STEM?

What is STEM? No common definition

1.0 STEM = Science, Technology, Engineering and Mathematics

2.0 "...an *interdisciplinary* approach to learning where rigorous academic concepts are coupled with real-world lessons as students apply *science, technology, engineering, and mathematics* in contexts that make connections between school, community, work, and the global enterprise enabling the development of STEM literacy and with it the ability to compete in the new economy" (Tsupros, Kohler, & Hallinen, 2009)

What are
"Inclusive STEM High Schools"?

Inclusive STEM high schools (ISHSs): designed to increase participation of under-represented students in STEM

More STEM Courses and Experiences

Diverse Student Body

Required College Prep Coursework

Positive Outcomes for All Groups

Admission Priority: Student Interest

Support Systems

Recognized as Innovative and Successful

The OSPrI Study Purpose

Understand ISHSs by
detailed look at
8 exemplary ISHSs to
see how they work—
case studies and
cross-case analysis

Candidate Critical Components

1. STEM-focused curriculum
2. Reform instructional strategies & project-based learning
3. Integrated, innovative technology use
4. Blended formal/informal learning beyond the typical school day, week, or year
5. Real-world STEM partnerships
6. Early college-level coursework
7. Well-prepared STEM teaching staff
8. Inclusive STEM mission
9. Administrative structure
10. Supports for under-represented students

Prominence Ratings of Critical Components (CCs) in 8 ISHSs

Critical Component	Inclusive STEM-Focused High School							
	A	B	C	D	E	F	G	H
1.STEM-Focused Curriculum	2.5	2	2	3	2	3	3	3
2. Reform Instructional Strategies and Project-Based Learning	3	2	1	3	1.5	2.5	2	2.5
3. Integrated, Innovative Technology Use	2.5	1	2	3	1.5	2	2	2.5
4. Blended Formal/Informal Learning Beyond the Typical School Day/Week/Year	2	1	2	3	1.5	2	1	3
5. Real-World STEM Partnerships	1	1	1	3	1.5	3	2.5	3
6. Early College-Level Coursework	1	3	1	1	2	3	1	1.5
7. Well-Prepared STEM Teaching Staff	3	2	2	3	2	2.5	2.5	2.5
8. Inclusive STEM Mission	2	2	3	2	2.5	1.5	2.5	2
9. Administrative Structure	3	2	3	3	2	3	2	2.5
10. Supports for Under-represented Students	3	3	3	2	3	3	1	2

The range of values for each critical component rating is 0 (not present) to 1 (low) to 3 (high). The "Total Rating" for each component is the sum of ratings for that component across all eight schools. "**" indicates those components that had a total rating of 19 or higher.

4 Prominent Critical Components

CC1: STEM-Focused Curriculum

- **Rigorous**
- **Required of all students**
- **Engineering**
- **CTE**

CC7: Well-prepared STEM Teaching Staff

- **Collaborative**
- **Innovative**
- **Strong varied STEM backgrounds**

CC9: Administrative Structure

- **Planned**
- **Connected**
- **Mission driven**
- **Autonomous**
- **Flexible**

CC10: Supports for Underrepresented Students

- **Personalized**
- **Student success**
- **College admission**

4 Emergent Critical Components

ECC1: Dynamic Assessment Systems

ECC2: Innovative, Responsive Leadership

ECC3: Positive Community and Culture of High Expectations

ECC4: Student Agency and Choice

OSPrI Logic Model: A Product of research evidence and feedback from 8 OSPrI ISHS leaders

OSPrI Logic Model

School Critical Components

1. **Structure**
   - CC9: Flexible & Autonomous Administration
   - CC3: Integrated, Innovative Technology
   - ECC1: Dynamic Assessment Systems for Continuous Improvement
   - ECC2: Innovative and Responsive Leadership

2. **What Students Learn**
   - CC1: College-Prep, STEM-Focused Curriculum for All
   - CC6: Early College-Level Coursework

3. **How Students Learn**
   - CC7: Well-Prepared STEM Teachers and Professionalized Teaching Staff
   - CC2: Reform Instructional Strategies and Integrated Project-Based Learning
   - CC4: STEM-rich, Informal Experiences
   - CC5: Connections with Business, Industry and the World of Work

4. **Social Dimension and Purpose**
   - CC10: Supports for Underrepresented Students
   - CC8: Inclusive STEM Mission
   - ECC3: Positive School Community and Culture of High Expectations for All
   - ECC4: Agency and Choice

Impacts During HS for All Students

What Students Know
- Have interest in STEM and knowledge of STEM careers
- Have deep STEM content and process knowledge

What Students Can Do
- Build creativity, collaboration, critical thinking and communication skills
- Demonstrate academic achievement
- Are prepared for post-secondary success

Who Students Become
- Self identify as STEM capable
- Have college savvy and aspirations
- Have ownership of/agency for learning
- Feel accountable to school community & mission
- Value individual differences
- Feel empowered and accepted

End of HS Outcomes

- Prepared for STEM in college
- Admission to and complete college, especially 4 year college
- Engage as a responsible community member within the school and as global citizens
- Apply STEM literacy to social and political issues
- Positioned for upward social mobility
- Lifelong learners

Policy Implications

- In ISHSs, under-represented students have 4 years to develop the knowledge, skills and "STEM social capital' to be successful in STEM college majors and careers

- Transformation this ambitious is *not* the result of a single program or curriculum unit or outside-of-school activity or one great teacher

- Students in transformative ISHSs experience complete immersion in STEM, inside of school and out in the community

- While ISHSs are still relatively few, they can be powerful examples of what "regular" students interested in STEM can do

- ISHSs are Next Generation High Schools: The future is now

- Thanks to NSF for funding our work.

For More information on OSPrI research, see:

OLD OSPrI website: ospri.research.gwu.edu

New OSPrI/iSTEM website: http://ctl2.sri.com/ospri/index.html

Or

See Sharon Lynch at the poster session (slynch@gwu.edu)