Understanding “Exemplar” Inclusive STEM High Schools: Preliminary Findings for a Theory of Action

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Definition of Inclusive STEM-Focused High Schools

- Accept students primarily on basis of STEM interest rather than aptitude or achievement
- Provide a STEM program of greater depth and breadth than usually required for high school graduation in their states
- Prepare students for college
- Target students from underrepresented groups in STEM fields
- Intend to open STEM opportunities to a wide range of students, including portions of the population with the highest rates of growth but who are persistently excluded from STEM fields

Goals and Research Questions

Because inclusive STEM-focused high schools could provide a solution to problems of economics and education, equity, and democratization of STEM in society, we ask:

1. Is there a core set of likely critical components shared by well-established, promising, inclusive STEM-focused high schools? Do other components emerge from the study?
2. How are the critical components implemented in each inclusive STEM-focused high school?
3. Can case-studies analyses of example case studies create a theory of action for successful inclusive STEM-focused high schools?

Prominence Ratings of Critical Components

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

STEM-Focused Curriculum

Inclusive STEM-focused high schools had more rigorous requirements for graduation than state:
- All of the schools visited had at the minimum one additional math and one additional science course than state requirements. As a result, more advanced courses were offered at these schools.
- All students were required to take the same classes and were expected to master material before moving forward. As a result, students could not elect out of more rigorous coursework.
- Math was a challenge across schools.

Well-Prepared Teaching Staff

School leaders had hiring autonomy and teachers were open to learning and growing as professionals:
- Teachers were a good match for the inclusive STEM-focused high schools. Teachers were collaborative, bought into the school vision, open to learning, and had a strong STEM background.
- Teachers were supported through regular, embedded professional development that was aligned with the school mission.
- The teacher collaboration helped to create the school wide vision.

Findings

Administrative Structure

Four common characteristics were identified among the inclusive STEM-focused high schools:
- The administrative structure was responsive to the community, school staff, and students.
- Membership in STEM networks and/or a charter network allowed the schools to utilize the resources of their network to build organizational capability.
- Evidence of a transformational leadership style was observed.
- School leaders created an inclusive, positive, STEM-focused school culture through the use of rituals and traditions to foster specific school wide norms, beliefs, attitudes, and customs.

Student Supports

The schools exhibited a fierce commitment to a mission of creating a challenging STEM school with a diverse student body where every student could be successful:
- System of advisors, tutoring, and data and communication systems that created a personalized education for every student.
- Extensive college and career counseling.
- “Atmospheric”- positive school culture, 21st Century skills and values.

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