Student Technology Access in an Urban STEM High School: The Missing Variable

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A science, technology, engineering, and mathematics (STEM), urban, public high school supported through a regional partnership and state grant funding

9th grade inaugurated in Autumn 2009. Remaining grades will be phased in through Autumn 2012
Key Elements

- **Clear vision** and **core values** that are shared
- **Principal and teacher leadership** in a teacher-led school characterized by shared governance
- **Relational trust** organized around distinct sets of role relationships and the normative criteria of respect, competence, personal regard for others, and integrity
- **Sense of community** through attachment, bonding, connectedness, and engagement
- **Concomitant social structures** that facilitate social translations of positive school culture into best practices.
## Background

<table>
<thead>
<tr>
<th>Demographic</th>
<th>School (%)</th>
<th>District (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>African-American</td>
<td>86.5</td>
<td>67.2</td>
</tr>
<tr>
<td>White</td>
<td>9.1</td>
<td>24.4</td>
</tr>
<tr>
<td>Economically Disadvantaged</td>
<td>78.2</td>
<td>69.9</td>
</tr>
<tr>
<td>Students with Disabilities</td>
<td>23.2</td>
<td>20.4</td>
</tr>
<tr>
<td>Mobility</td>
<td>6.8</td>
<td>17.0</td>
</tr>
</tbody>
</table>
Methodology

- Descriptive Case Study (Yin, 2008)
- Student Technology Access and Use Survey (STAUS) developed after extensive review of existing and validated instruments.
- Interview protocol provided basis for semi-structured interview with school administrator
Student Technology Access & Use Survey

Development
  ◦ Constructs
    1. Access & use outside of school
    2. Use in school
    3. 21st Century Skills
    4. Use of technology for learning

Implementation
The Missing Variable
Technology Access Gap

- **Students report using a computer at school every day or most days**
  - ✓ 99% Hughes STEM (n = 109)
  - ✓ 45% District (n = 2322)

- **Students report using a computer at home every day or most days**
  - ✓ 68% Hughes STEM (n = 109)
  - ✓ 72% District (n = 2282)

Source: District Student Survey, May 2011 (Cincinnati Public Schools)
District students have greater access at home than at school (most schools have a positive gap)

✓ District gap is 27% (or 72% - 45%)
✓ Hughes STEM has a negative gap of 31% (or 68% - 99%)
## Results

### Student technology access

<table>
<thead>
<tr>
<th>Ethnicity</th>
<th>Question 11: Students that have enough computer access to complete school assignments At School</th>
<th>Question 5: Students that have enough computer access to complete school assignments Outside of School</th>
<th>Question 7: Students that have internet access At Home</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>African-American</strong></td>
<td>84.0% (n = 426)</td>
<td>65.1% (n = 330)</td>
<td>73.4% (n = 372)</td>
</tr>
<tr>
<td><strong>White</strong></td>
<td>91.7% (n = 33)</td>
<td>55.6% (n = 20)</td>
<td>91.7% (n = 33)</td>
</tr>
<tr>
<td><strong>All Students</strong></td>
<td>84.0% (n = 479)</td>
<td>64.9% (n = 370)</td>
<td>75.3% (n = 429)</td>
</tr>
</tbody>
</table>
Established school characteristics beyond demographics
Examined sources of tech funding and support
Describe tech landscape of the building
Tech utilization level by students and staff (Nevens’ stages of tech integration)
Inquire as to awareness of student technology needs
Nevens’ Stages of Technology Integration

- Stage one: Early Tech
- Stage two: Developing Tech
- Stage three: Advanced Tech
- Stage four: Target Tech

Case Study Findings

- The access students have to technology at Hughes STEM is significantly greater than it is away from school.
- The access gap is reversed for Hughes STEM.
- Survey results indicate a significant difference in internet access for students based on ethnicity.
Case Study Findings

Internet Access by Ethnicity

<table>
<thead>
<tr>
<th></th>
<th>African-American</th>
<th>White</th>
</tr>
</thead>
<tbody>
<tr>
<td>School *</td>
<td>73.4</td>
<td>91.7</td>
</tr>
<tr>
<td>HS Only</td>
<td>77.0</td>
<td>93.2</td>
</tr>
<tr>
<td>PreK - 12</td>
<td>78.6</td>
<td>92.9</td>
</tr>
<tr>
<td>All Persons</td>
<td>81.0</td>
<td>92.9</td>
</tr>
</tbody>
</table>

Source: U.S. Dept. of Commerce 2009 and STAUS 2011*
Conclusions

It is important to obtain a complete picture of student technology access by understanding how and where students access ICT away from school.
Conclusions

- The Technology Access Gap
  - The case study has identified a missing variable in educational research by describing technology use and access at a large urban STEM high school
  - Metric identifies under-resourced students
  - Accommodation programs can help fill the gap, enabling schools to provide equitable access to information and communication technologies.
Suggestions for Best Practices

- Implement student technology access survey
  - STAUS offers schools a tool to assess technology access & use at school and away from school
- Provide accommodations to students that have limited or no access outside of school
- Additional grants could cover the cost of developing and maintaining a check-out program for low-income students
Future Work

- Research the cause of student technology access limitations and teacher perceptions and develop programs to fill the gap.
- Expand interviews with students and teachers to create a richer description of technology access issues.
- Complete a validation study of STAUS offering a research instrument to educators.
References