The Principal Leadership for STEM Self-Assessment

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• Background on STEM education evaluations
• Lack of information about principal leadership for STEM
• Develop principal leadership for STEM survey
• Why this matters
• Question & answer
The Golden LEAF STEM Initiative

3 years  14 grants  226 schools  12K teachers  25K students
What about the principals?
Principal leadership for STEM is relatively un-researched and complex.
Not Much Research on Principal Leadership for STEM

Main components of principal leadership.

Principal leadership for science education.

Principal role growing more complex.

Principal leadership for STEM education?
Science and technology curricular reforms may be short-lived due to a lack of professional development provided for principals (Cuban 2001; Mclaughlin and Mitra 2001).
Pilot Constructs

- Shared Decision-Making
- Infrastructure
- Professional Development
- Advocacy
- Vision
- Evaluation
Regarding the STEM program, I …

| Make sure teachers have access to resources that facilitate STEM teaching and learning (e.g. lab facilities, equipment, project spaces). | Strongly Disagree | Disagree | Neither Agree nor Disagree | Agree | Strongly Agree |
| Have articulated a vision for the STEM project. | | | | | |
| Encourage teachers to incorporate project-based learning with integrated content. | | | | | |
| Communicate how the STEM project supports the larger strategic plan for the school. | | | | | |
| Include teachers in decisions about measuring student success in STEM. | | | | | |

115 principals completed Pilot P-STEM
School Level

<table>
<thead>
<tr>
<th>Percent</th>
<th>Elementary School</th>
<th>Middle School</th>
<th>High School</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>50</td>
<td></td>
<td>30</td>
<td>10</td>
<td>5</td>
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Assessed Construct Validity with Exploratory Factor Analysis

- Maximum likelihood analysis was used with promax rotation to allow correlated factors.
- Two loadings above .3 were considered cross-loadings.
- Factor loadings above .4 were considered significant.
- Parallel analysis and interpretability were used to determine the number of factors.
Expected 6 Factors:
- Vision
- Infrastructure
- Professional Development
- Shared Decision-Making
- Advocacy
- Evaluation

Found 3 Factors:
- Hard Skills
- Soft Skills
- Infrastructure
13 items were deleted: 8 items cross loaded & 5 items did not load on a factor.

Several items were reworded for clarity and specificity regarding STEM programs.

16 items were added …
North Carolina’s 11 STEM Attributes & STEM Program Implementation Rubric

11 Attributes

STEM Attributes
Reference STEM Implementation Rubric

Integrated Science, Technology, Engineering and Mathematics (STEM) curriculum, aligned with state, national, international and industry standards

A1. Project-based learning with integrated content across STEM subjects
A2. Connections to effective in and out-of-school STEM programs
A3. Integration of technology and virtual learning
A4. Authentic assessment and exhibition of STEM skills
A5. Professional development on integrated STEM curriculum, community/industry partnerships and postsecondary education connections
A6. Outreach, support and focus on underserved, especially females, minorities, and economically disadvantaged

On-going community and industry engagement
B1. A communicated STEM plan is adopted across education, communities and businesses
B2. STEM work-based learning experiences, to increase interest and abilities in fields requiring STEM skills, for each student and teacher
B3. Business and community partnerships for mentorship, internship and other STEM opportunities that extend the classroom walls

Connections with postsecondary education
C1. Alignment of student’s career pathway with post-secondary STEM program(s)
C2. Credit completion at community colleges, colleges and/or universities

43-Component Rubric

1 page per attribute
Assessed Content Validity

15 experts rated items: “Essential,” “Useful but not Essential,” or “Not Necessary”

Lawshe’s Content Validity Ratio was calculated

10 items were dropped

7 items were added
Principal Leadership for STEM (P-STEM) Survey, 2014.

Principal role is important in STEM education programs.

Need multiple tools for measuring school leadership.
Questions?

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Sign-up on our email list and we will share completed P-STEM Survey with you.