Marie Curie, 1867-1934

Cultivating Diverse Talent in STEM (CDTIS)

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Tuba City
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BIO5 Institute

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CDTIS Partners

Tuba City Unified HS
Greyhills Academy HS
Shonto Preparatory Technological HS
Desert View HS
University of Arizona

Project Hallmarks

Invite exceptionally talented Navajo students

to be scientists...

...and become doctors, researchers, teachers, legislators, parents, that know science, and can use and discuss it.

The Problem of Identifying Talent

<table>
<thead>
<tr>
<th>Before</th>
<th>District-Wide</th>
<th>Gifted Program</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hispanic</td>
<td>58 %</td>
<td>26 %</td>
</tr>
<tr>
<td>Caucasian</td>
<td>37 %</td>
<td>72 %</td>
</tr>
<tr>
<td>African American</td>
<td>3 %</td>
<td>1.3 %</td>
</tr>
<tr>
<td>Other</td>
<td>2 %</td>
<td>0.7 %</td>
</tr>
</tbody>
</table>
CDTIS Research Question

How Do We Know Talent?

- By looking at grades, references, essays?
- By looking at how students USE knowledge and solve problems? (DISCOVER method)

CDTIS worked with Diné schools to develop new methods to identify students with exceptional talent in STEM

Teacher PD: Problem-based Instruction

<table>
<thead>
<tr>
<th>Problem/Question</th>
<th>Approach/Method</th>
<th>Solution/Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
<td>Teacher</td>
<td>Student</td>
</tr>
<tr>
<td>I</td>
<td>Known</td>
<td>Known</td>
</tr>
<tr>
<td>II</td>
<td>Known</td>
<td>Unknown</td>
</tr>
<tr>
<td>III</td>
<td>Known</td>
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<td>IV</td>
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<td>Unknown</td>
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<td>V</td>
<td>Known</td>
<td>Unknown</td>
</tr>
<tr>
<td>VI</td>
<td>Unknown</td>
<td>Unknown</td>
</tr>
</tbody>
</table>

Logical/Mathematic
Mechanical/Technical
Naturalistic

Creative Problem Solving

Alternative Assessment

Logical/Mathematical
Mechanical/Technical
Naturalistic

Connecting Knowledge

Ethnic Balance in Roswell, NM, Gifted Program After Using DISCOVER

<table>
<thead>
<tr>
<th>Ethnic Group</th>
<th>DISCOVER Schools</th>
<th>Gifted Program</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hispanic</td>
<td>73.5 %</td>
<td>71.5 %</td>
</tr>
<tr>
<td>Caucasian</td>
<td>21.0 %</td>
<td>26.5 %</td>
</tr>
<tr>
<td>African American</td>
<td>4.2 %</td>
<td>2.0 %</td>
</tr>
<tr>
<td>Other</td>
<td>1.3 %</td>
<td>0.0 %</td>
</tr>
</tbody>
</table>
CDTIS Student Engagement

- Summer Laboratory Research Internship
- School-year research and community engagement
- Industry and ASU/NAU research internships
- Networking, friends, mentors
- College credits, research experience
- Reading, writing, debating, celebrating

http://www.keys.pharmacy.edu

Benefits To Community

- Students explore and grow in STEM.
- Students can and will go to college.
- Communities develop expertise to solve problems.
- Navajo expertise in STEM will expand.
- Navajo representation in STEM will grow.
- Schools will identify and foster talented students.

Data: Students as Scientists

<table>
<thead>
<tr>
<th>Student Project</th>
<th>The Most Efficient Method of Removing Salt from Heads for Use in Risk Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dr. Pamela Brown</td>
<td>Public Health Research, Material and Child Health, Tissue Morphology</td>
</tr>
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<tr>
<th>Student Project</th>
<th>Does Re-Boot Work Cause Injury in Fumonisin Oligopeptides</th>
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<tbody>
<tr>
<td>Dr. Arno Dermhaus</td>
<td>Ecology and Evolutionary Biology, Biogeo, BIES</td>
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<th>Does Extra Work Activate &quot;Lack Of&quot; in Fumonisin Oligopeptides</th>
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<tr>
<th>Student Project</th>
<th>Cell Differentiation in Cultured Na-NaCl-Rich Polaroid Cluster Cells</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dr. Karen Peterson</td>
<td>Cellular Biology, Biogeo</td>
</tr>
</tbody>
</table>

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<tr>
<th>Student Project</th>
<th>Expression Profile of Choroid and Graft Cells in the Wulst Aorticocapillary Phenomenon</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dr. Frank Tao</td>
<td>Plant Biology, Molecular and Cellular Biology, BIES</td>
</tr>
</tbody>
</table>

Data: Teacher Testimonies

- "The internship experience has transformed them from goofy high school juniors into dedicated science students." (Science teacher; Tuba City HS)
- "They became completely new individuals. We were all so impressed that the Superintendent asked them to speak to the school board." (Teacher; Greyhills Academy)
- "The students came back with higher morals. They are talking about science..." (Biologist teacher; Greyhills Academy)
- "He is using technical language and has a spark."
- "Because of the assessment he was able to convince himself that he could go to college. He borrowed $20 bucks this morning to drive to college." - Student received a merit scholarship to Blanding Utah. (Science teacher; Shonto Tech Prep)

CDTIS Observations

- Customary assessments do not tell the whole story about students.
- Homework
- Classroom participation
- Test & exams
- Students benefit from exploring occupations.
- Limiting learning to school is a recipe for disaster.
- Native students are lost without support from their communities.
- Relationships beat goals & objectives.

Gratitude

- National Science Foundation – Math Science Partnership Award #1321190
- Kathleen Bergin
- Marti Lindsey
- Harold Begay
- C. June Maker
- Uwe Hilgert
- Frans Tax

- Navajo Nation Human Research Review Board (NRR13.166)
- Beverly Becenti-Pigman
- Wallace McGill
- Mark C. Bauer
- Ron Maldonado
- Raymond Reid
- Rebecca Izzo
- Calvin White
- Ursula Knoll-Wilson
Questions?

hilgert@email.arizona.edu

How can your students keep coming?

It costs between nothing and $2,000 for your students to transform from “goofy high schoolers” into serious seekers.