Three Innovative Techniques to Introduce STEM Careers

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What are we talking about here!?

FutureMaker Mobile Learning Lab Program Overview and Results

- Layer 1: Augmented and Virtual Reality (AR/VR) Experiences
- Layer 2: Hands-On Demonstrations
- Layer 3: Making it Mobile!
Introducing the FutureMaker Mobile Learning Lab
A program by:
Wichita State University Campus of Applied Sciences (WSU Tech)

- Climate Controlled 72 foot Immersive Learning Machine on Wheels!
- Kansas Statewide service for
  - Middle and high schools
  - STEM/CTE events and camps
  - Adult education programs
What's Inside That Trailer?

STEM and technical career immersive hands-on demonstrations...

*no textbooks here!*
Where We’ve Been So Far

- **Blue Pin** – One Visit
- **Red Pin** – Two Visits
- **Green Pin** – Three or More Visits
Key Outcomes Since We Began the Program

6,449
Middle/High school and adult students served

15,418
Event visitors in the community including K-12 students

21,867
Total visitors served since program inception
Layer 1: Augmented and Virtual Reality Experiences

- zSpace AIO 3-D Computer Systems
- VR Simulators – Welding and Painting
- VR Guided Tours
Classroom Program – zSpace AIO STEM Activity

Immersive Active 3-D Education Tool

- Students navigate models with 360 degree flexibility
- Applications cover a wide range of STEM subjects
- Adaptable to formal/informal educational settings
Classroom Program – zSpace AIO STEM Activity

We set these up everywhere!

Middle School 8th Grade Program

High School 10th Grade Program

Goodwill NexStep Adult GED Program
Classroom Program – zSpace AIO STEM Activity

See students interacting with the zSpace All-In-One (AIO) units here:

https://drive.google.com/file/d/1_doHguQZhhrclZ0pmpiOIDA_wh-Qnwtx/view?usp=sharing
Mobile Lab Program – VR Welding and Painting

Root weld - MIG Type

Aviation/Automotive - Gravity Feed
Mobile Lab/Classroom Program – Google Expeditions

Guided STEM/CTE subject tours including:
- Aviation
- Healthcare
- Ecology
Layer 2: Hands-On Demonstrations

- Industrial Robotics
- Design, CNC Machining, and 3-D Printing
- Aircraft Sheet Metal Assembly
“Write your name” event demo (McConnell Airshow 2018)
Package stacking programming sequence (beta testing)
Classroom Program – Design, CNC Machining, and 3-D Printing

In-development design stations:
- Additive manufacturing (3-D printing)
- Subtractive manufacturing (CNC machining)

(sorry for the stock photos, we haven’t launched these demo’s yet)
Mobile Lab Program – Aircraft Sheet Metal Assembly

Aviation Manufacturing:
- Sheet metal drilling, riveting, and assembly
Layer 3: Making it Mobile

Economics
Powered By Partnerships
Why Wheels Works
This Looks Expensive!
(Economics of a Mobile STEM/CTE Lab)

<table>
<thead>
<tr>
<th>Mobile STEM/CTE Lab¹</th>
<th>Year 1 Startup Costs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mobile Rig</td>
<td>$115,000</td>
</tr>
<tr>
<td>Equipment</td>
<td>$140,000</td>
</tr>
<tr>
<td>Labor⁵</td>
<td>$112,000</td>
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<tr>
<td><strong>Total³</strong></td>
<td><strong>$367,000</strong></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Dedicated School Labs²</th>
<th>Year 1 Startup Costs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Classroom Space</td>
<td>Assume free</td>
</tr>
<tr>
<td>Equipment⁴</td>
<td>$1,680,000</td>
</tr>
<tr>
<td>Labor⁶</td>
<td>$81,500</td>
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<tr>
<td><strong>Total³</strong></td>
<td><strong>$1,761,500</strong></td>
</tr>
</tbody>
</table>

That’s nearly 5 times more expensive when setup in schools!

Notes: figures are estimates based on realistic scenario

1 – Startup and year 1 costs for a single mobile unit
2 – District composed of 15 middle schools and 9 high schools, 38 lab visits per year
3 – First year start up cost scenario
4 – Half of district schools to have a dedicated STEM lab (12 separate labs)
5 – One director, one coordinator, and 2 part-time staff
6 – One science teacher and one para-educator
Why Wheels Works

- Outreach to schools at any distance – a field trip in a box!
- Technical college program recruiting
- Community event service
- Cost efficiency
Attention is the Currency of Learning

We live in a 3-D world!

As such, what is intuitive and engaging to students?

✓ 360° freedom of motion
✓ Engagement through multiple sensory inputs
✓ Physical movement of the body
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