Engineering the Green Future
Science, Technology, and the Design Process

High School Curriculum Initiative
Lee Pulis, Museum of Science, Boston
California STEM – October 29, 2015

Gary Curts is today’s Presenter from IAT
What is an Organizer?

(EN1 page 41)

**or-gan-iz-er** (noun): anything designed to keep smaller things so they stay together and are easy to find and retrieve when needed.

Organizers store, protect, and separate stuff, and provide easy access...generally making our lives more orderly.
So Let’s do a Quick-Build!

- Build an “integrated mobile device holder”
- Work alone, in pairs, or in teams
- Think about manufacturing processes
- Keep work table protected and organized
- Clean up waste and messes as you go along
- Observe diverse approaches & solutions
- Do Life Cycle Analysis for improvement
Project-Based Learning Attributes

1. Learn in Context
2. Requires Team Collaboration and Cooperation.
3. The Project provides the Conceptual Umbrella to attach concepts and vocabulary to and to strengthen the retrieval of knowledge.
4. Strengthens 21st Century Skills
21st Century Skills

- Creativity
- Communication
- Critical Thinking
- Collaboration

- Information & Media Literacy
- Information and Communication Technology

- Flexibility & Adaptability
- Initiative and Self Direction
- Social and Cross-Cultural Skills
- Productivity and Accountability
- Leadership and Responsibility
7E’s

1. Engage
2. Elicit
3. Explore
4. Explain
5. Elaborate
6. Extend
7. Evaluate
What Is *Engineering the Future*?

- 1. STEM curricula
- 2. Focusing on Technology & Engineering
- 3. 9th grade book
- 4. Possible “Capstone” course
- 5. Treatise on “Energy”
- 6. PBL & its Ramifications!
ETF’s 5 Major Goals

1. Students will develop a deep and rich understanding of Technology.

2. Students develop abilities to use the Engineering Design Process.


4. Students understand how advances in technology affect human society.

5. Students apply fundamental concepts about energy to a wide variety of problems.
Curriculum Materials
Available from EtF publisher: It’s About Time

- **Student Text**
  - First-person stories from a diverse cadre of 32 engineers and technicians
  - Engineering, science, and math concepts embedded in real case studies

- **Engineer’s Notebooks**
  - with hands-on tasks & timelines

- **Teacher Guide**
  - Videos
  - Project Supplies Kits
  - Integrated Assessments
  - Online Teacher Support Site
Student Projects Map to Standards

Project 1: Engineering Design & Manufacturing

Project 2: Construction and Thermal Flow

Project 3: Fluid and Thermal Power Systems

Project 4: Electrical Systems & Communications
Technologies are the products and processes created by engineers. Engineers create the designed world, using **The Engineering Design Process**

<table>
<thead>
<tr>
<th>Stage</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>define the problem</td>
<td>redesign</td>
</tr>
<tr>
<td>research the problem</td>
<td>communicate</td>
</tr>
<tr>
<td>develop possible solutions</td>
<td>test and evaluate</td>
</tr>
<tr>
<td>choose the best solution</td>
<td>create a prototype</td>
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# 6 STEMWA Practices

<table>
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<tr>
<th><strong>Scientific Inquiry</strong></th>
<th><strong>Technological Means</strong></th>
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<td>Formulate a Question</td>
<td>Become aware of the web of technological</td>
<td>Define a human need</td>
<td>Consider a real problem</td>
<td>Focus on a topic or scenario</td>
<td>Discover a user need or desire</td>
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<td>Research how others have answered it</td>
<td>systems on which society depends</td>
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<td>Research existing models</td>
<td>Prewrite</td>
<td>Search for Apps that address it</td>
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<td>Brainstorm hypothesis and choose one</td>
<td>Learn how to use new technologies as</td>
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<td>Make modeling assumptions</td>
<td>Organize</td>
<td>Define an App concept (functional specs)</td>
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<td>Conduct an experiment</td>
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<td>Draft</td>
<td>Design user interface (UI) &amp; experience (UX)</td>
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<td>Modify hypothesis based on results</td>
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<td>Analyze model</td>
<td>Review: get feedback</td>
<td>Develop App platform and code</td>
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<td>Draw conclusions, write paper</td>
<td>advancement of science and engineering</td>
<td>Finalize design, make drawings</td>
<td>Interpret results and compare with reality</td>
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<td>Submit paper for peer review</td>
<td>Make informed decisions about technology</td>
<td>Present optimal solution to client</td>
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1. Museum of Science, Boston & It’s About Time, Mt. Kisco, New York
2. Vanguard Direct, New York, New York
3. National Science Foundation - A Framework for K-12 Science Education
4. Synthesis of Various Internet Sources
On-Line Support for Educators

Password-protected virtual communities where teachers can:

**EtF TEACHER SUPPORT**

– Participate in a facilitated PD course.
– Troubleshoot and share with other teachers.
– Get quick moderator assistance and support.
– Access electronic resources related to course content and pedagogy.  
  http://etf.mos.org
Thank You!!

Contact Us – Engineering the Future
National Center for Technological Literacy
Museum of Science, Boston
Booth 103 – Its About Time

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• sbeasley@iat.com
• 914-708-8420
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