Implementing STEM Project Based Learning with Y4Y

IL 21st CCLC Pathways to Success Conference
Normal, IL ~ May 3, 2016
YOUR FACILITATOR

Tania Lazar
Training Specialist
SESSION OBJECTIVES

• Explore why project-based learning benefits students.
• Develop strategies to implement PBL into your program.
• Identify Y4Y PBL Resources that can be customized and utilized in your program.
Online Professional Learning and Technical Assistance for 21st CCLCs

Learn | Teach | Tools | Network

Y4Y > Learn > Project-Based Learning

Project-Based Learning

Introduction to Project-Based Learning

The introduction provides an overview of project-based learning, including the benefits of authentic projects and engaging students in a process of inquiry. Learn how to design hands-on projects and move from a driving question to a culminating event to a reflection on learning.

Implementation Strategies

Find strategies to move project-based learning into practice, including setting project goals and keeping projects student-centered. Learn how to sustain your project over time and how to document your project’s progress.

Coaching My Staff

Learn how to coach staff to effectively plan projects, engage youth, and document learning. Identifying project-based learning for both new and building senior staff skills.

Glossary

PROJECT-BASED LEARNING

Search This Topic

Type here to filter terms...

Show Project-Based Learning Glossary
How can we utilize Y4Y to design and facilitate engaging STEM projects?
In-depth study of real-world topic or problem
Directed by students and hands-on
Focuses on DOING something rather than passively learning ABOUT something
CHARACTERISTICS OF SUCCESSFUL PROJECTS

• Include student voice and choice
• Focus on high-interest topics and questions
• Emphasize active learning
• Build 21st Century Skills
  – Critical thinking, teamwork, organization
• Result in a final product or event
• Opportunities for reflection
Understanding STEM

- Science
- Technology
- Engineering
- Mathematics
Getting Started

- Focus on issues that affect students
- Start hyper-local for younger students and expand with age
- Identify community needs
- Encourage active investigation
THREE PHASES OF PROJECT-BASED LEARNING

PHASE I
Designing & Developing

- Project kickoff: Conceive, Plan & Launch
  - Site Coordinator & Staff identify needs and opportunities.
  - Community resources, issues
  - Youth interests, needs, goals

- Formulate a driving question
  - Select an issue that impacts both youth and community.

- Organize a project goal and plan
  - Plan should include a goal to answer driving question and launch project
  - Project Planning Form

- Launch the project

PHASE II
Planning & Implementing

- Learn by doing: Inquire, Work & Discover
  - Site Coordinator & Staff coach teachers to coach youth and foster relationships.
  - Youth are engaged in learning, problem solving, communication and teamwork.
  - Revisit the driving question: The driving question is part of everyday activities.

- Site Coordinator & Staff plan for SHOWTIME
  - Logistics are key!

- Youth practice!

PHASE III
Celebration, Evaluation

- Showtime: Celebrate & Share
  - Site Coordinator & Staff organize and facilitate.

- An Audience affirms the work.
  - The audience may be public or internal, big or small, invite the project director.

- Reflect on growth
  - Youth participate.
  - Community provides feedback.

- Youth demonstrate and share their learning in public, promote pride in their work!

planned goal

progress & preparation towards goal

goal realized
STEM Process

- Look Around
- Make Sense of It All
- Ask a Question
- Think Again
- Get An Idea
- Try It Out

Teach/ STEM/ STEM Everyday Training to Go
Active Investigation

• Assign a timekeeper
• Indoor 5-minute field trip!
• Brainstorm project ideas around accessibility
BRAINSTORMING TOOL
DRIVING QUESTIONS

What Goes Into A Good Question

- Provocative
- Complex
- Real-World
- Open-Ended
- Substantial
- Intriguing
- Challenging
- Actionable
- Relevant
Your question must meet the following criteria:

- Open-ended
- Relevant to the real-world
- Challenges students to use higher-order thinking skills
- Connected to youths’ lives
- Potential for actionable solutions
LET’S PRACTICE

<table>
<thead>
<tr>
<th>QUESTION</th>
<th>WHO</th>
<th>VERB/TO PIC</th>
<th>AUDIENCE</th>
</tr>
</thead>
<tbody>
<tr>
<td>[Wild Card]</td>
<td>[Wild Card]</td>
<td>[Wild Card]</td>
<td>[Wild Card]</td>
</tr>
<tr>
<td>How can...</td>
<td>I We</td>
<td>Build... Create... Make...</td>
<td>Real-World Problem</td>
</tr>
<tr>
<td>How do...</td>
<td>We as, [Roles] [Occupations]</td>
<td>Design... Plan...</td>
<td>For a Public Audience</td>
</tr>
<tr>
<td>Should...</td>
<td>[Town] [City] [County]</td>
<td>Solve...</td>
<td>For a School</td>
</tr>
<tr>
<td>Could...</td>
<td>[State] [Nation]</td>
<td>Write...</td>
<td>For a Classroom</td>
</tr>
<tr>
<td>What...</td>
<td>[Community] [Organization]</td>
<td>Propose... Decide...</td>
<td>For an Online Audience</td>
</tr>
</tbody>
</table>

Topic: Engineering
What changes can we design to make this building more accessible?
CHECK FOR UNDERSTANDING

Name 4 things you’ve learned about Driving Questions

• Open-ended
• Allow for standards to be embedded
• Should not be easily answered
• Should be engaging
WHO WRITES THE QUESTION?

Student Voice

Teacher Choice

http://bie.org/object/video/elementary_project_courtyard_redesign
CELEBRATE
YOUR DRIVING QUESTION

Your driving question is important!

• Put it to music.
• Make banners.
• Make charts.
• Make graphic posters.

If students don’t know the question, how will they answer it?

http://learninginhand.com/blog/drivingquestions
# Three Phases of Project-Based Learning

## Phase I: Designing & Developing
- **Project Kickoff**
  - Conceive, Plan & Launch
  - Site Coordinator & Staff:
    - Identify needs and opportunities.
    - Community resources, issues
  - Youth interests, needs, goals
  - Formulate a driving question:
    - Select an issue that impacts both youth and community.
    - Plan a project goal and plan:
      - Plan should include a goal to answer driving question and launch project
      - Project Planning Form
  - Launch the project.

## Phase II: Planning & Implementing
- **Learn by Doing**
  - Inquire, Work & Discover
  - Site Coordinator & Staff Coach:
    - Teach youth and foster relationships.
  - Youth are engaged in learning, problem solving, communication and teamwork.
  - Revisit the driving question, the driving question is part of everyday activities.
  - Site Coordinator & Staff Plan for Showtime, logistics are key!

## Phase III: Celebration, Evaluation
- **Showtime**
  - Celebrate & Share
  - Site Coordinator & Staff organize and facilitate.
  - Youth demonstrate and share their learning in public, promote pride in their work.
  - An Audience affirms the work.
    - The audience may be public or internal, big or small, invite the project director.
  - Reflect on growth:
    - Community provides feedback.
    - Youth participate.

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<th>Phase I</th>
<th>Phase II</th>
<th>Phase III</th>
</tr>
</thead>
<tbody>
<tr>
<td>Designing &amp; Developing</td>
<td>Planning &amp; Implementing</td>
<td>Celebration, Evaluation</td>
</tr>
<tr>
<td>Project Kickoff - Conceive, Plan &amp; Launch</td>
<td>Learn by Doing - Inquire, Work &amp; Discover</td>
<td>Showtime - Celebrate &amp; Share</td>
</tr>
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<td>Formulate a driving question: Select an issue that impacts both youth and community. Plan a project goal and plan: Plan should include a goal to answer driving question and launch project. Project Planning Form</td>
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</table>
PROJECT IDEAS

Projects should provide opportunity for active exploration:

• Extend beyond the classroom

• Allow for the practice of core content knowledge and skills in relevant and meaningful ways

• Connect to field-based investigations, community explorations and work internships.

• Require real investigations using a variety of methods, media and sources
Driving Question: What changes can we design to make this building more accessible?

Project Idea: Build a PowerPoint presentation with pictures and descriptions of the proposed changes to the building.
House of Cards

Materials:
• 50 Index Cards
• One roll of tape
• Marbles

Building Rules:
• Test the strength and stability of a square, arch, and triangle.
• Select the one shape you will use to build your house.
• Your building must be at least four stories high.
• You cannot lay a shape on its edge, but you can tape shapes together.
• A paper plate will go on top to hold the marbles
### Project Based Learning Project Planner

<table>
<thead>
<tr>
<th>Driving Question</th>
<th>Planning Check</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Is the project</td>
</tr>
<tr>
<td></td>
<td>• Based on youth interests?</td>
</tr>
<tr>
<td></td>
<td>• Based on youth input?</td>
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<tr>
<td></td>
<td>• Appropriate for the amount of time?</td>
</tr>
<tr>
<td></td>
<td>• Engaging, interesting, sustainable?</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Project Description</th>
<th>Planning Check</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Do the objectives</td>
</tr>
<tr>
<td></td>
<td>• Maintain, practice, or expand on what youth already know or are able to do?</td>
</tr>
<tr>
<td></td>
<td>• Clearly specify outcomes?</td>
</tr>
<tr>
<td></td>
<td>• Tie to demonstrations and documentation of learning?</td>
</tr>
<tr>
<td></td>
<td>• Connect with skills or knowledge needed for success in school?</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Objectives for Learning and Development</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Materials Needed</th>
<th>Planning Check</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Are materials needed to</td>
</tr>
<tr>
<td></td>
<td>• Guide youth in making a project plan?</td>
</tr>
<tr>
<td></td>
<td>• Carry out the project work?</td>
</tr>
<tr>
<td></td>
<td>• Help youth document learning?</td>
</tr>
<tr>
<td></td>
<td>• Help youth set learning objectives?</td>
</tr>
<tr>
<td></td>
<td>• Establish agreements with or among youth, partners, volunteers?</td>
</tr>
<tr>
<td></td>
<td>• Review and evaluate event?</td>
</tr>
<tr>
<td></td>
<td>• Reflect, revise?</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Implementation</th>
<th>Project activities, who is involved</th>
</tr>
</thead>
<tbody>
<tr>
<td>Start date</td>
<td>End:</td>
</tr>
<tr>
<td>Start date</td>
<td>End:</td>
</tr>
<tr>
<td>Start date</td>
<td>End:</td>
</tr>
<tr>
<td>Start date</td>
<td>End:</td>
</tr>
</tbody>
</table>

• Develop one project idea related to the your driving question.
GATHER RESOURCES

• Assemble authentic field work and tools.
• Arrange for expert speakers or mentors.
• Find appropriate books, websites and other resource materials.
Utilizing STEM Experts

- Experience working with youth and 21st CCLC programs
- Roles and responsibilities of expert and program staff
- How the expert fits into your larger STEM goals
- Possibility of long-term relationship building
## Involving Community Partners Checklist

Use this checklist to identify potential community partners. Next, brainstorm and check off ways partners might be involved in Civic Learning & Engagement projects (or are involved currently).

<table>
<thead>
<tr>
<th>Type of Partner</th>
<th>Name of Partner (Group, Organization, or Individual)</th>
<th>Options for Involvement</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Interview or conduct research</td>
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<tr>
<td>Government:</td>
<td></td>
<td></td>
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<tr>
<td>Elected Official</td>
<td></td>
<td></td>
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<tr>
<td>Parks and Recreation</td>
<td></td>
<td></td>
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<tr>
<td>Department</td>
<td></td>
<td></td>
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<tr>
<td>Court House/Judicial</td>
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<tr>
<td>Department</td>
<td></td>
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<tr>
<td>City Council</td>
<td></td>
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<tr>
<td>Fire Department</td>
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<tr>
<td>Police Department</td>
<td></td>
<td></td>
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<tr>
<td>State or Federal Department</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Community organizations:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Neighborhood Civic Association</td>
<td></td>
<td></td>
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<tr>
<td>Service group</td>
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<tr>
<td>Advocacy group</td>
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<tr>
<td>Local health organization</td>
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<tr>
<td>Local environmental organization</td>
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<td></td>
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<tr>
<td>Local education organization</td>
<td></td>
<td></td>
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<tr>
<td>Other</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Tools/ Civic Learning and Engagement/ Assess and Reflect
4. FACILITATING YOUTH INPUT

- Leading vs. Facilitating
- Keeping discussion on track
- Creating a safe environment
- Creating guidelines and setting parameters
HONORING MULTIPLE VIEWPOINTS

Incorporating Multiple Viewpoints Checklist

Use this checklist to help assess whether your program is supportive of multiple viewpoints and perspectives, and to help youth enrich their perspectives on critical issues while building communication skills.

<table>
<thead>
<tr>
<th>Supportive Practice / (Listening and Speaking Skills)</th>
<th>Currently Doing</th>
<th>Will Consider Doing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Discussions and Debates</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Establish a safe environment and set ground rules for respectful listening and discussions.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Have students develop and sign a pledge regarding civil discourse and respectful conversations.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Before a discussion, ask students to complete an anonymous survey to gather individual opinions and perspectives.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>As the facilitator, ask probing, but non-judgmental questions that explore the reasoning behind opinions or convictions.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Use a combination of small and large group discussion formats.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Allow for disagreement and grant equal time for those with opposing views.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Assign students to different sides of a debate to ensure they consider opposing arguments.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Have different students facilitate or moderate discussions over time.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other:</td>
<td></td>
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<thead>
<tr>
<th>Supportive Practice / (Reading Skills)</th>
<th>Currently Doing</th>
<th>Will Consider Doing</th>
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<tbody>
<tr>
<td>Research and Investigation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Have students research both sides of an issue and make a chart comparing positions.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Have students read articles or media accounts of an issue and separate fact from opinion.</td>
<td></td>
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<tr>
<td>Use articles or media accounts of an issue and ask students to identify the political orientation or possible bias of the author.</td>
<td></td>
<td></td>
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<tr>
<td>Other:</td>
<td></td>
<td></td>
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</table>

<table>
<thead>
<tr>
<th>Supportive Practice / (Writing Skills)</th>
<th>Currently Doing</th>
<th>Will Consider Doing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Responding to Issues</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ask students to write journal entries about an issue so all students can have an opportunity to express perspectives, especially those who may be hesitant to speak out in front of peers.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ask students to write letters or design flyers to advocate for their stance on issues. Post these around the classroom and compare and discuss.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Give a writing prompt in which students must take the opposing view and make their case.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other:</td>
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  - Plan for SHOWTIME: logistics are key!

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- **Learn by Doing**
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  - Reflect on growth: Community provides feedback.

---

**PROJECTED-BASED LEARNING**

**planned goal** → **progress & preparation towards goal** → **goal realized**
REFLECT & EVALUATE

• Encourage student to reflect on their learning and process
• What were the challenges?
• What did they accomplish?
• Are there next steps?
• Consider group discussion, journals
• Document learning
PLAN TO DOCUMENT THE LEARNING

- Align with overall project objectives
- Portfolios, project logs, self-assessments, etc.
DEMONSTRATE LEARNING: CULMINATING PRODUCT OR EVENT

- Project culminates in a final event or product
- Celebrate learning, achievement
- Public demonstration
  - Inventors’ fair
  - Community meeting and presentation
  - Play with original script
Create a culminating event for your project.
Citizen Science

- Meaningful connections with the natural world
- No single “right” answer
- Inquiry-based learning
- Data used by real scientists

Example: Jason Project
Example: Journey North

Tools/ Learn More Library/ Web-based Resources
What are your next steps in enhancing project based learning in your program?
Tania Lazar
Training Specialist

tlazar@foundationsinc.org

Visit www.y4y.ed.gov