Getting Started with Project-Based Learning in STEAM

Project-Based Learning (PBL) has many benefits for STEAM instruction. Language educators, however, often wonder how to create projects tailored to the content and language needs of ELLs.

In this webinar, we will:

• discover how PBL incorporates opportunities for meaningful language use across the four skills, as well as the acquisition of subject-specific language

• identify the characteristics of strong projects in STEAM courses

• explore a framework for developing clear objectives for PBL

• analyze sample projects for the ELT classroom
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Anne is an applied linguist and language educator. For over 20 years, she has helped ESL specialists, world language instructors, K-12 teachers, and university faculty to engage in teaching practices that support multilingual students. Her research focuses on how people communicate in multilingual classrooms and communities. Anne holds a Ph.D. in Educational Linguistics and an MS.Ed. in TESOL from the University of Pennsylvania, where she is currently a Professor of Practice.
Getting Started
With Project-Based Learning
in STEAM
In this webinar, we will:

- Identify characteristics of strong projects for STEAM courses.
- Write at least one objective for a sample STEAM project.
- Select 1-3 appropriate language supports for a sample STEAM project.
Together, we will:

- Define project-based learning (PBL) and discuss its key characteristics
- Review two different STEAM projects
- Review tips for using STEAM projects in English classes
Getting to Know You!

What’s your STEAM team? Do you teach...

- science
- technology
- engineering
- arts
- math

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Defining project-based learning (PBL) in STEAM
In traditional approaches to teaching, teachers transmit knowledge to students.
Banking metaphor

Teachers deposit knowledge into students’ heads
In project-based learning, teachers create projects that require students to work together to develop solutions to real-world questions and problems.
Project-based learning is:

- a form of *learning by doing*
- a more “hands on” way of engaging students with STEAM content
Instead of learning ABOUT science,

students design experiments and test hypotheses just like real scientists.
Instead of learning ABOUT math,

students use mathematical thinking to answer questions and propose solutions.
But what if I’m a language teacher... is PBL right for my students?
What are some characteristics of strong STEAM projects in English language classes?
What are the people doing?
What language skills are they using?
Students doing PBL are...

- Working together
- Interacting
- Using the 4 skills (reading, writing, speaking, & listening)
- Engaging in completing something specific
Do all projects in STEAM have so much language learning potential?
What makes a strong STEAM project?

• Multiple opportunities to use subject-specific language

• Integration of the four skills (reading, writing, listening, speaking)

• Inclusion of opportunities for authentic language use & negotiation of meaning

• Clear & purposeful STEAM objective
Let’s take a look at two projects

Topic: Let’s plan a party

Which project is a STEAM project?

Why? Give your reason.
Which project is a STEAM project?

**Project 1**
It's your friend's birthday! With your group, plan a surprise birthday party. What will the menu be? What activities will you do? Be ready to present your party plan to the class. The best party plan will win a prize!

**Project 2**
It's your friend's birthday! With your group, plan a surprise birthday party. Your shopping list is ready to go. Oh no! You are low on funds. You will need to look at unit prices to get the best deal on each item. Be ready to share your plan with the class!
Let's take a closer look: Project 1

- What would you like for dessert?
- Let's buy a chocolate cake!
- We should hire a band.
- I want Karaoke!

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Project 1

• Use of vocabulary related to party planning (e.g., dessert, chocolate cake)

• Authentic or “real life” use of listening & speaking skills

• Modal verbs (e.g. would, should) to express wants & desires in polite ways (e.g., we should hire a band)
Does Project 1 meet our criteria?

Does it...

- Include multiple opportunities to use subject-specific language
- Integrate the four skills (reading, writing, listening, speaking)
- Include opportunities for authentic language use & negotiation of meaning
- Have a clear & purposeful STEAM objective.
Project 2: What do you see?

Put your observations in the chat

How much does the chicken cost per kilo?

It would be $23.80 total. Is the fish cheaper?

It's $2.38. I circled the unit price. Do we have enough money for 10 kilos?

Fish is $6.00 per kilo, but we need 3.5 kilos. Chicken is less expensive.

Shopping list
milk
1 dozen eggs
fish to cook
cheddar cheese
some kind of soup?
Project 2

• Use of vocabulary related to party planning

• Authentic or “real life” use of listening & speaking skills

• Subject-verb inversion to ask questions

• Modal verbs to discuss possibilities

• Comparative adjectives

• Use of mathematical reasoning to work out best unit price for each item on their party planning list
Does Project 2 meet our criteria? Yes/ No? Why?

- Include multiple opportunities to use subject-specific language
- Integrate the four skills (reading, writing, listening, speaking)
- Include opportunities for authentic language use & negotiation of meaning
- Have a clear & purposeful STEAM objective.
Does Project 2 meet our criteria?

- Include multiple opportunities to use subject-specific language
- Integrate the four skills (reading, writing, listening, speaking)
- Include opportunities for authentic language use & negotiation of meaning
- Have a clear & purposeful STEAM objective.
Success!

STEAM Project for language learning
I see the benefits of PBL, but will my supervisor?
How do I write clear language objectives?
Consider using this formula...

Students will be able to (SWBAT)...

Action + Language forms
Let’s return to Project 2

It's your friend's birthday!
With your group, plan a surprise birthday party. Your shopping list is ready to go.

Oh no! You are low on funds.
You will need to look at unit prices to get the best deal on each item. Be ready to share your plan with the class!
Students will be able to (SWBAT)... determine the most cost-effective shopping list.

What language skill is “determine”?

What language forms will students use?
Your turn!

Project 2

It's your friend's birthday! With your group, plan a surprise birthday party. Your shopping list is ready to go.

Oh no! You are low on funds. You will need to look at unit prices to get the best deal on each item. Be ready to share your plan with the class!

Students will be able to (SWBAT)... Action + Language forms
Project Objectives: Example 1

**Action**

SWBAT read product labels and circle the unit prices of products using subject-specific vocabulary.

**Language forms**

![Image of product labels and unit prices]
Project Objectives: Example 2

**Action**

SWBAT orally compare the unit prices of products using comparative or superlative adjectives.

**Language forms**

<table>
<thead>
<tr>
<th>Product</th>
<th>Unit Price</th>
<th>Retail Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beef</td>
<td>$9.94</td>
<td></td>
</tr>
<tr>
<td>Matoes 410g</td>
<td>$4.36</td>
<td>$1.79</td>
</tr>
<tr>
<td>Apple Juice</td>
<td>$2.45</td>
<td></td>
</tr>
</tbody>
</table>
But wait...

What if students need some help to work independently in English?
What strategies do you use to get students to work independently in English?
Language Support Strategies
Category #1: Modelling

Show students what to do by acting out the interaction
Modelling
Language Support Strategies for PBL

Category #1: Modelling
Language Support Strategies

Category #2: Input Enhancement

- Highlight key vocabulary in materials.
- Use **abundancy and redundancy strategies**.
  - + Repeat the word often in your teacher talk.
  - + Engage multimodal strategies (gestures, visuals, write/post/send in chat).
- Practice vocabulary through structured language activities.
- Provide a mini-lesson to address pertinent grammar points.
Students, remember that chicken is sold by the pound. This is the unit. The price per pound is the unit price.
How do you practice vocabulary?
Language Support Strategies for PBL

Category #1: Modelling
Category #2: Input Enhancement
How can I do project-based learning in a large class?
Use grouping strategically

Homogeneous groups:
Students at same level of language proficiency work together

Heterogeneous groups:
Students at different levels of language proficiency work together
Provide different materials for different levels of students
Give students at different proficiency levels different jobs to do
Category #3: Project Differentiation

- Group flexibly.
- Provide different materials for different levels of students.
- Customize expectations for project completion according to student levels.
What language support strategies would you use for Project 2?

Category #1: Modelling
Category #2: Input Enhancement
Category #3: Project Differentiation
Can I do project-based learning in an online class?
What do you think?

Can language teachers do project-based learning in an online environment?

Yes or No? How?
Online options

Breakout rooms
Chat
SMS/Text
New STEAM project for Engineering
How do we make a smartphone stand out of everyday objects?

STEAM focus:
+ engineering design process
+ demonstrating understanding of stability

How do we make a smartphone stand out of everyday objects?
Each group will...

1. Research & share design ideas
2. Develop a procedure for building a prototype
3. Build a prototype
Language objectives

Develop a procedure for building a prototype

SWBAT orally name the materials needed to build a smart phone stand using subject-specific vocabulary.

SWBAT write the procedure for building the prototype using ________________.
Sample language objective

SWBAT write the procedure for building the prototype using verbs in the simple present tense and sequence words.
What language support strategies would you use for the smart phone project?

Category #1: Modelling

Category #2: Input Enhancement

Category #3: Project Differentiation
STEAM + Project-based Learning = Success
Thank you!

Questions or concerns?
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Reflection Questions

1. Have you ever tried Project-based Learning (PBL)? What went well? What did you learn from your experience? What might you change after participating in this session?

2. Think about your curriculum. How might you include STEAM-related content in projects in your English language classes?

3. How might you prepare students to succeed with PBL? What support might you need to provide before and during a project?