STEAM-Powered Instruction: Practical Approaches for ELT Educators

STEAM (Science, Technology, Engineering, the Arts and Mathematics) education is fast becoming an essential approach to learning, helping students develop and use crucial 21st-century skills such as collaboration, creativity, and critical thinking.

In this webinar, we will:

• examine what STEAM instruction is and how to integrate it into the ELT classroom
• explore how integrating STEAM topics in ELT settings can teach students how to take calculated risks and how to learn through experiences ... all while using the target language and having a bit of fun!
Eileen has been an ESL instructor for 19 years in the United States, Japan, China, Hong Kong, India, and Afghanistan. She has a master's degree in TESOL from Concordia University.

Eileen is passionate about languages—she has taught English at major corporations, elementary schools, universities, community colleges, and private schools. She has led a variety of teacher education events, published internationally, presented her research at conferences, and had her art featured at festivals and galleries around the world.

Previously, Eileen was a U.S. Department of State Virtual English Language Fellow in India and Afghanistan.
STEAM-Powered Instruction: Practical Approaches for ELT Educators
Session Plan

• Review STEAM education and its benefits
• Discuss tips to help develop activities that incorporate STEAM skills
• Explore 3 sample activities
• Talk about challenges of integrating STEAM
Definition of STEAM

“An approach to learning that uses Science, Technology, Arts and Mathematics as an access point for guiding student inquiry, communication, and critical thinking”
Which STEAM category could you add more of into your English language activities?
What are the goals of STEAM?

- Student-centered
- Gives target language and learning objective a purpose
- Increases motivation and engagement
- Opportunities for authentic language
- Develops leadership and managerial skills
- Integrates 21st century skills
## Higher-Level Thinking

<table>
<thead>
<tr>
<th>Remembering</th>
<th>Applying</th>
<th>Evaluating</th>
<th>Analyzing</th>
<th>Understanding</th>
<th>Creating</th>
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<tr>
<td>• find</td>
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<td>• predict</td>
<td>• deconstruct</td>
<td>• paraphrase</td>
<td>• solve</td>
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Video: STEAM and English

• While watching, think about:
  • what you see
  • what STEAM goals are being met
What skills were being used?
Session Plan

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Tips for Developing Activities

1. Interest-inventory
   • Which apps and technology do you most like to use?
   • How do you use them?
   • Which types of hands-on projects do you like to do? (art projects, construction, technology, etc.)
   • How do you share what you make with others?
2. Collaborative Projects

• Students have a voice and choice
  • Can choose partner, products to produce, sub-topics or questions
• Keep it interesting
  • Introduce a design issue or problem
  • Have teams swap projects
• Learn through conversation
  • Student-to-student teaching
  • Lessens the teacher’s need to encourage student participation
• Increased scaffolding
3. Connect to STEAM Subjects

If you are teaching patterns in spelling, connect it to patterns in STEAM topics:

- odd and even numbers
- sound waves
- buildings
- coding
- dance choreographies
- abstract paintings
How do you, or how will you, use these tips to integrate more STEAM skills in your classes?
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STEAM in literature

• Use QR codes as hints as to what story you will be reading next
• Read about a famous engineer, astronaut, scientist, etc.
• Create a project from the literature
  • If you read a children’s book about a caterpillar...
    • build a caterpillar or butterfly from recycled materials
    • create a poster
    • draw the life cycle of a butterfly
    • read about monarch butterflies' journey from the United States to Mexico
Activity 1

QR Code Gallery Walk activity

• Materials:
  • Internet
  • 5 – 6 photos in .jpg or .png format
  • Paper
  • Printer
  • Gallery Walk worksheet
  • Students will need cellphones
Activity 1

- Teacher Preparation:
  - Pick an article, text, or book
  - Think of 5 to 6 hints
  - Download 5 to 6 images of the hints
    - [www.pixabay.com](http://www.pixabay.com)
    - [www.unsplash.com](http://www.unsplash.com)
  - Upload the photos to [www.me-qr.com](http://www.me-qr.com)
  - Download the QR codes
  - Print them and hang on walls
Activity 1

• Teacher will ask...
  • What’s your favorite book?
  • What do you think we’ll read next?

• Teacher will model using QR codes—give the first hint
Activity 1

- Give language support
  - Modals of possibility:
    - Might be, could be, must be
  - Sentence Starter:
    - I think that...
  - Graphic organizer

Part 1:

**Directions:** Record the hints below with the corresponding numbers.

- Hint #1
- Hint #2
- Hint #3
- Hint #4
- Hint #5
- Hint #6

Part 2:

**Directions:** In a group, discuss what you think the book might be. Please use the following language. You can guess up to 3 times. Write down your answers in full sentences.

To express your opinion, use the phrase "I think that..."

How sure are you?

<table>
<thead>
<tr>
<th>Possibility</th>
<th>Language</th>
</tr>
</thead>
<tbody>
<tr>
<td>30%</td>
<td>might be</td>
</tr>
<tr>
<td>50%</td>
<td>could be</td>
</tr>
<tr>
<td>90%</td>
<td>must be</td>
</tr>
<tr>
<td>100%</td>
<td>is</td>
</tr>
</tbody>
</table>

Ex. I think that it might be "The Jungle Book".

Guess #1 __________________________

Guess #2 __________________________

Guess #3 __________________________
Activity 1

• This activity...
  • was student-centered
  • gave target language and learning objective a purpose
  • increased motivation and engagement
  • gave opportunities for authentic language
  • developed leadership and managerial skills
• Uses higher-level learning
• Uses 21st – century skills
Activity 1

• Adaption for online:
  • You can post the QR codes online
    • Google Drive
    • www.padlet.com

• Extension Activity:
  • Students can create their own QR code activity for:
    • favorite books
    • book report
    • characters
What sort of scaffolding might you need to provide for this activity?
Activity 2

Life cycle of the butterfly

• Material:
  • A book or article about a caterpillar
  • Internet
  • Computers or phone
  • A graphic design or template tool of your choice, like www.canva.com
  • Article on life cycle of butterfly
Activity 2

• Teacher preparation:
  • Choose an article about the life cycle of the butterfly
  • Print out worksheets and graphic organizers or have links ready to go
  • Make sure students have access to computers, tablets, or phones
  • Make a model of the poster that you want to show
Activity 2

• Teacher will ask...
  • What does the caterpillar eat?
  • The caterpillar changed several times. What did it change into?

• Model the poster for them

• Let students know they’ll be making a poster of the life cycle of a butterfly
  • They need to label each stage and write about it
  • Have illustrations that go along with it
Activity 2

• Give language support
  • Transitions words for sequence of events
    • First, next, then, finally
  • Graphic organizer

• Sentence starter:
  • The first stage is...
  • The next stage is...

Caterpillar Book

<table>
<thead>
<tr>
<th></th>
<th>Beginning</th>
<th>Middle</th>
<th>End</th>
</tr>
</thead>
<tbody>
<tr>
<td>Graphic</td>
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<td>🦋</td>
</tr>
</tbody>
</table>

- Chart graphic of caterpillar showing stages from beginning (cocoon) to middle (leaf) to end (butterfly).
Activity 2

• Give instructions:
  • Students will work with a partner and fill out the graphic organizer
  • When finished, put them into groups of 4
  • Then students will use a graphic design tool to make a poster on the life cycle of the butterfly
    • Assign roles
    • When finished, students will present
How might you adapt this activity for a large class?
Activity 2

• This activity...
  • was student-centered
  • gave target language and learning objective a purpose
  • increased motivation and engagement
  • gave opportunities for authentic language
  • covered science, art, and technology
• Uses higher-level learning
• Uses 21st – century skills
Activity 2

- Adaption for offline:
  - Create a poster using paper
  - Use a worksheet instead

- Extension activity
  - Create a butterfly or caterpillar out of recycled materials
  - Focus on health by discussing what the caterpillar eats on what days
Activity 3

Crocodile versus Alligator

• Material:
  • Article
  • Venn diagram print out
  • Internet
  • Computers or cellphones
Activity 3

• Teacher preparation:
  • Choose an article about crocodiles versus alligators
  • Print out worksheets and graphic organizers
  • Make a model of activity

• Teacher will ask...
  • What’s the difference between a crocodile and an alligator?

• Model the Venn diagram and Kahoot quiz

• Let students know they’ll be making a quiz
Language Goals: Relational phrases (e.g. compare, contrast, differences, similarities etc.)

1. Focus on sentence frames that apply to higher-level learning
   "They are different because a _____ has _____, and a _____ has _____

2. Have students notice grammar clusters

   “Crocodiles are bigger, have v-shaped snouts and are more aggressive. They also have visible bottom teeth and are light green, brown or light grey.”

   “Crocodiles are bigger, have v-shaped snouts and are more aggressive. They also have visible bottom teeth and are light green, brown or light grey.”

   “Crocodiles are bigger, have v-shaped snouts and are more aggressive. They also have visible bottom teeth and are light green, brown or light grey.”
Activity 3

• Give Instructions:
  • Students will read the article on crocodiles versus alligators
  • Divide into groups
  • Use a Venn diagram to show differences
  • Create an online quiz using kahoot.it or a similar platform
  • Will give Kahoot code to another group to play
  • Will receive feedback from another group
Activity 3 – Venn Diagram

**Crocodile**
- Saltwater
- Lighter
- Longer snout
- V-shaped head
- More aggressive
- Live all over the world

**Reptiles**
- Same family
- Apex predators
- Good swimmers
- Eat fish
- Old

**Alligators**
- Freshwater
- Darker
- Shorter snout
- Wider head
- Less aggressive
- Live in China and the U.S.
Activity 3
Which has a longer, more V-shaped head, a crocodile or an alligator?
Correct

Answer Streak 1

+ 501

You're on the podium!
Which are darker, crocodiles or alligators?

- Crocodile
- Alligator
Correct

Answer Streak 2

+ 732

You're on the podium!
Which are more aggressive, crocodiles or alligators?
Correct

Answer Streak 3

+ 677

You're on the podium!
1st place

Highest score!
What other language topics might you incorporate in this type of activity?
Activity 3

• This activity...
  • was student-centered
  • gave target language and learning objective a purpose
  • increased motivation and engagement
  • gave opportunities for authentic language
  • covered science, art, math, and technology

• Uses higher-level learning
• Uses 21st – century skills
Activity 3

• Adaption
  • Create a quiz on Quizlet
  • Write quiz on paper

• Extension
  • Math activity
    • Flashcards
    • Worksheets
    • Scissors
    • Pen or pencil
Activity 3 – Extension Activity

0.5 is equal to 1/2
Activity 3 – Extension Activity

0.8 \text{ is greater than } \frac{3}{4}
Activity 3 – Extension Activity

0.2

is less than

1/4
Session Plan

• Review STEAM education and its benefits
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What challenges have you experienced integrating STEAM skills in your English classes?
Understand the challenges of integrating STEAM

- Curriculum change is difficult
- Time
- Not everyone is an expert
- Coordinating
- Training
- Country dependent
- Test based
- Buy-in and collaboration
Resources

A. Online Resources:
   1. www.nasa.gov/stem
   3. https://learn.concord.org/
   4. https://blog.ck12info.org/top-10-stem-resources/

B. Materials:
   1. ask parents for donations
   2. bring materials from home
   3. use recycled material
Summary

- STEAM education and its benefits
- Discussed tips for developing activities that incorporate STEAM skills
- Explored 3 sample activities
- Talked about challenges of integrating STEAM
What’s one activity or topic you will use in your classroom?
References


References

• http://www.canva.com/
• http://www.kahoot.it/
• http://www.qr-me.com/
• JingJing International Education Group. https://m.facebook.com/watch/?extid=SEO----&v=857374101712935&_rdr
Thank you!

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AE Facebook page: facebook.com/AmericanEnglishatState
Reflection Questions

1. How do you support 21st-century skills development in your English language classes? Have you ever added STEAM elements to activities and lessons to help achieve that goal?

2. How might you plan to add STEAM components into your lesson plans? Are there systematic steps you might take when developing lesson and unit plans?

3. How might your students react to an increased amount of STEAM elements in your curriculum? Why? How can you prepare to support them? How could you learn about which STEAM topics might interest them the most?