Using Computational Thinking Practices to Create Better Problem Solvers!

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Hello! We are...

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SESSION OUTCOMES

Gain awareness of...
What computational thinking is.
Benefits of using CT practices intentionally.

Be able to do!
Recognize where and when CT is happening in your classroom and identify ways to be more explicit to promote better problem solving.
WHAT IS COMPUTATIONAL THINKING?

Go to: www.Sli.do.com
Enter: P109
How can I formulate this problem so it can be solved using computers?

Computational Thinker

@sheena1010
computersforcreativity.com
Decomposition
Breaking something down into smaller, more manageable parts

Patterns
Looking for similarities or patterns between things

Debugging
Finding and fixing errors or mistakes

Abstraction
Focusing on the information I need while ignoring the unnecessary details
LET’S USE THE CT PRACTICES TO SOLVE A PROBLEM!
Let’s do some CT!

Joey is visiting Detroit. He would like our help in seeing the city. He expects to be taken on a tour visiting the following city attractions.

- Comerica Park
- Joe Louis Arena
- Fox Theatre
- MGM Grand
- Hart Plaza
- WCCC
- Greektown Casino
- Masonic Temple
- Ford Field
- Opera House
- Renaissance Center
- Joe Louis Arena
- MGM Grand
- Greektown Casino
- WCCC
- Masonic Temple
- Opera House

And he wants to take the subway!
A Subway Map

A subway map is an abstraction of the city map.

It shows how the attractions are connected by subway lines.

Abstraction: Creating a representation that shows useful information and hides unnecessary detail
Your task....

You must work out a route on the subway that starts from the hotel and will take Joey to every site.

Joey is in the city for the day, and he doesn’t want you to waste his time. He will be unhappy if he passes through the same place twice.

Obviously, he also wants to end up back at his hotel that evening.
How did you know your answer worked?

- How did you check your answer?
- What were the requirements?
  - Start at hotel
  - End at hotel
  - Visit everything
  - Don’t visit anything more than once

- Did anyone have a “solution” that didn’t meet the requirements?
- If a student presented an incomplete solution, how could using the list of requirements help them fix it?

Debugging: a systematic process of finding and correcting errors, or bugs
Let’s debug!

Work with a partner to debug this solution!
WHAT CT PRACTICES DID YOU USE TO SOLVE THE PROBLEM?

WHEN DID YOU USE THE CT PRACTICES?

THINK ABOUT A RECENT SCIENCE LESSON...WHICH OF THE CT PRACTICES WERE BEING USED?
We use CT everyday and this is how people persevere through problems...but, how can we ensure ALL students are using the CT practices to be better problem solvers?
BE EXPLICIT ABOUT CT PRACTICES!
Let's see CT in action in a 3rd grade classroom
REFLECTING ON WHAT WE SAW....

Teacher....

Students...
Reflecting On What We Saw....

**Teacher...**

“How were the challenges similar?”

“Look at my CT wall, what did we look for?”

“What CT skill will we use to fix Hopper Popper?”

**Students...**

“Both challenges used force.”

“Patterning—force is a similarity.”

“Debugging—finding errors or mistakes.”
“Break it down!”

- Equitable Participation
- Teaches students to see the big picture, think for themselves, and deliver creative solutions with minimal guidance.
KATLYN’S LEARNING JOURNEY

“It’s okay to make mistakes!”

× Stronger Problem Solvers
× Students are becoming more aware of strategies they are already using and are now using them more intentionally to help drive their learning.
## Many Entry-Points for CT in Science Specifically

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YOUR TAKEAWAYS!

- 30 seconds of processing time
- 30 seconds turn and talk
- A few ideas from the group.
DEBUNKING A MYTH

...Let’s first get rid of the idea that computational thinking is programming. “It is not even thinking like a computer, as computers do not, and cannot, think.” (Source: BBC).
Computational thinking is using problem solving strategies...

- breaking down complex problems into more familiar ones (**problem decomposition**)
- using a sequence of steps to solve the problem (**algorithms**)
- reducing the complexities of a problem and focusing on the essential details to solve it (**abstraction**),
- and using digital tools and technology to automate the solutions (**automation**).
Computational thinking is not just using computers.

Computational thinking is not equivalent to mathematics.
THANK YOU!

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