Computational Thinking Begins At An Early Age

INST 652 - Design Thinking and Youth

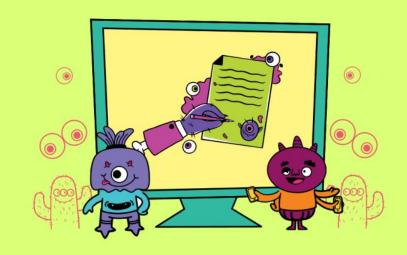
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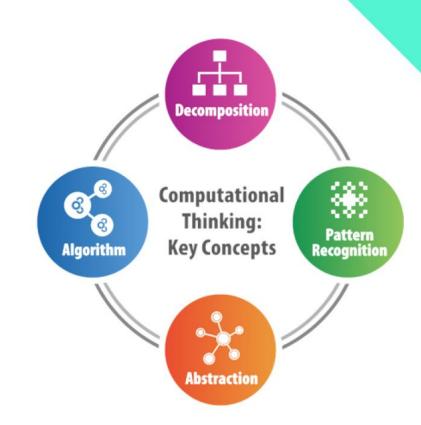
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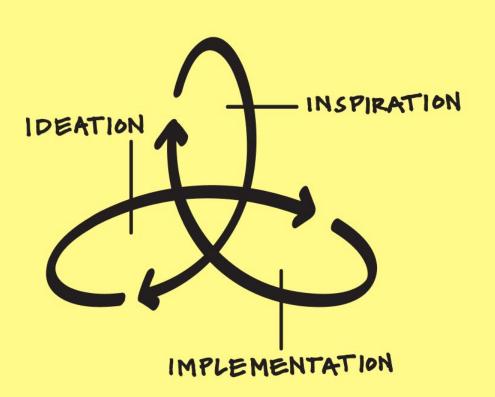


Background

- A growing number of ordinary objects are being designed to operate via computer programs.
- 21st-century skills aim to teach creativity, critical thinking, clear communication, teamwork, and effectively solving complex problems with collaboration.
- computational thinking as the thought process of finding a solution to a problem step by step, in a logical and organized manner, much like a computer
- The development of a think-like-a-computer capability will benefit professionals in any field.



Design Process



- How might we develop a computational way of thinking in youth?
- How might we help youth connect computational thinking concepts to real-life situations?
- How might we build a learning platform that explains
 CT concepts more straightforwardly and is suitable for youth from an early age?
- How might we create a space that promotes the learning of CT concepts through collaboration?

How Might We?

How Might We Help Children
Connect Computational
Thinking With The Real World
At A Young Age?

Refined
How Might
We?

User Interviews

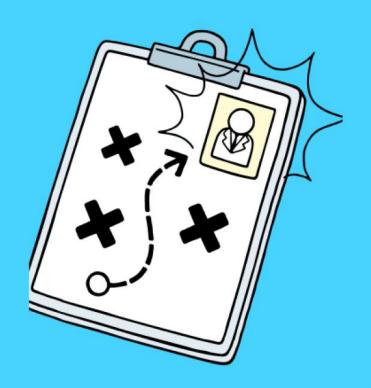
- In order to understand the current learning methods of computational thinking, I interviewed some youth
- The results show that there is a need to tweak the existing learning approaches.



Valuable Insights

- The biggest challenge is that many students haven't been exposed to computational thinking early, causing difficulty understanding its concepts.
- Furthermore, since computational thinking is a mental process, they find it difficult to adapt.
- The second biggest challenge is that many students
 have not been able to connect CT to everyday life since
 they have been trained to memorize it just for good
 grades.





Requirements

The design solution must:

- · Stress the relevance of computational thinking to real-life situations
- · Be user-friendly for youth.
- Encourage youth to view computational thinking as more than just programming.
- Versatile enough to be used in different areas, including, but not limited to, classrooms, after-school activities, and homes.
- Be easily comprehendible by elementary school students through the use of simple language, colorful interfaces, etc.
- · Learn CT concepts in a collaborative environment
- · Learning activities must be fun and engaging for the kids.
- Be universal and accessible to kids coming from different backgrounds.

Target Users

Who

Kids between the ages 7 and 13 years

How

The solution will be presented in a real-life setting, so the knowledge can easily be applied in the real world.



Why

Primary-grade children don't shy away from taking risks.

We can take advantage of young children's natural inclination to explore and play and encourage problem-solving skills to improve students' thinking

Ideation Of Design Solutions

Design Session 1

The first design session focused on generating ideas for teaching computational thinking to kids.

Question Of the Day: What is your process for solving a problem that has been given to you?

Introduction Phase

As an ice-breaker activity, I selected Show and Tell as a fun way to get children talking about their favorite possessions.

Puzzle Solving Phase

The kids solved the puzzles and used the Google

Jamboard to reflect on the experience.

Sticky Notes Technique

I evaluated the puzzle-solving activity, and this would provide feedback and directions for future improvements on how I can best assist kids in learning how to solve problems

- When children are given problems or puzzles based on their favorite things, they relate to the problem much better.
- They love visual stimulation, and it's also helpful to have a backstory on puzzles, as it gives them the sense that they are solving a realworld problem.
- The kids felt that they preferred to solve problems as a team rather than individually.
- Another idea was to allow kids to design their own puzzles so that they can both create the problem and think about various different solutions, which they felt was a good strategy to improve problemsolving skills.
- One of the kids had the idea of showing real-world applications after solving various puzzles so that they could relate what they learned.

Big Ideas

Design Session 2

I utilized the second design session to present kids with initial prototypes of the games I designed based on the first design session.

Question Of the Day: What do you prefer? Presented with a game and its rules, you proceed to play the game or design your own game?

Introduction Phase

As an ice-breaker activity, I selected Show and Tell as a fun way to get children talking about their favorite possessions + QOD discussion

Storyboarding Phase

Storyboarding was used to present a digital mockup of the game prototypes to the children.

Sticky Notes Technique

I used the sticky notes technique to pose questions about the different features of the designs to the kids

Design Solutions

Arcade Game

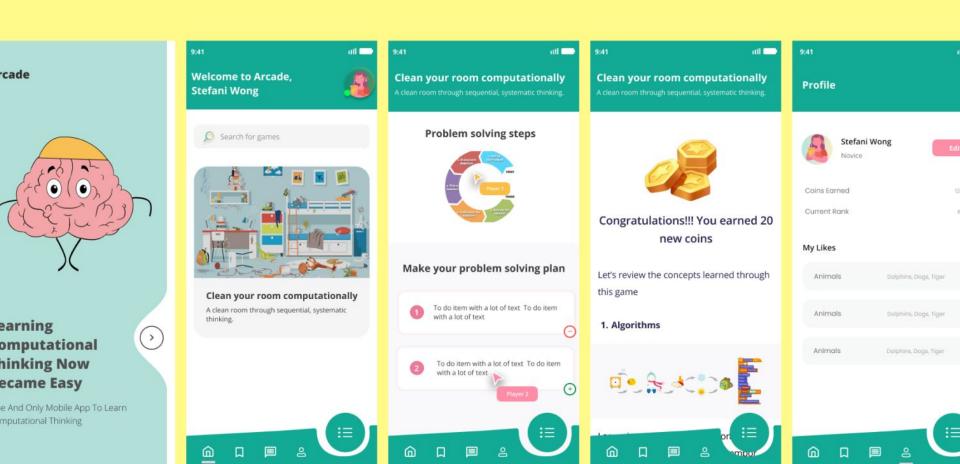
- This learning app contains a list of games that introduces various concepts of computational thinking.
- The kids will create their own problem-solving plans.
- After completing a game, they learn about where the concept will be used in the real world through visual learning.
- This app can be used in a collaborative setting where kids connect with their friends to solve puzzles.

Design Your Own Board Game (Unplugged CT)

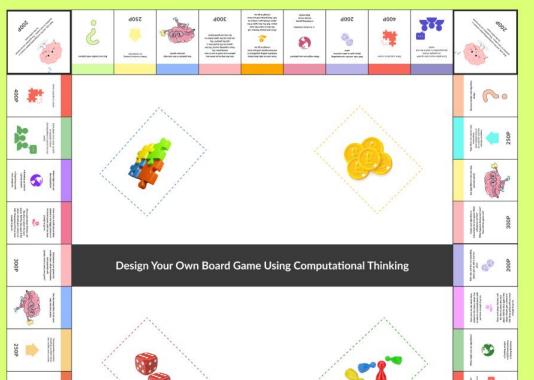
- This design solution is specifically designed for students who don't have technology access and
 for parents who wish to cut down the computer time for their kids.
- I call this method Unplugged CT because it enables kids to learn concepts without using a computer.
- Kids can play this game with their own imaginations and a variety of craft materials.
- When children invent their own games, they create their own algorithms when composing the rules. They will be following many concepts like the Conditionals (For example, when a player

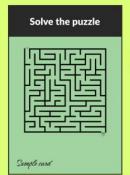


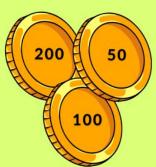
Design Solution 1: Arcade App



Design Solution 2: Design Your Own Board Game (Unplugged)







- A way of thinking takes a lot of time to develop. For future professionals to fully master and use CT, it is crucial to introduce CT concepts to kids at an early age.
- Learning activities must be fun and engaging for the kids.
- Always design solutions that are universal and accessible to kids coming from different backgrounds.
- Estimate more time for recruiting participants

Takeaways

Thank You