Run, Llama, Run: A Computational Thinking Game for K-5 Students Designed to Support Equitable Access

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1. Motivation

- Educational, or serious, games are becoming increasingly popular
- We believe that these games and tools should be designed to provide equitable access to students with and without access to digital devices
- Games and tools can be distinguished between the way the interaction mode for creating programs and observing the solution of what's created, but each has a cost associated with it, making some tools more cost accessible than others

RESEARCH GOAL:
Create a computational thinking game for K-5 students that is cost accessible and designed to be cooperative.

2. Background

- **Educational Games** are used to teach a user a skill or technique through the use of a game, also known as serious games. A common example of this in computer science and computational thinking is Code.org [1].
- **Block-Based Programming** is a method of using blocks of small segments of code to create a program. This allows users to learn to code while avoiding issues with syntax and programming language [2].

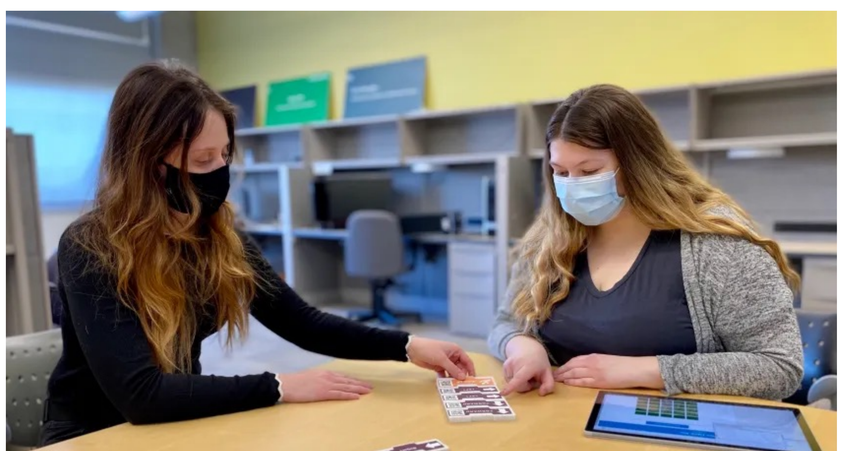
3. Tangible vs Digital

- Not everyone has access to digital devices to learn computer science
- Students may not be able to practice outside of the classroom
- Games that are completely digital require a digital device and sometimes internet and game access, which can become expensive
- There are inexpensive alternatives to digital games

OBSERVING SOLUTION	CREATING CODE: DIGITAL	CREATING CODE: TANGIBLE
DIGITAL	$$	$$
TANGIBLE	$$$	$..$$$

$ - Least Expensive, $$$ - Most Expensive

4. Run, Llama, Run In Practice



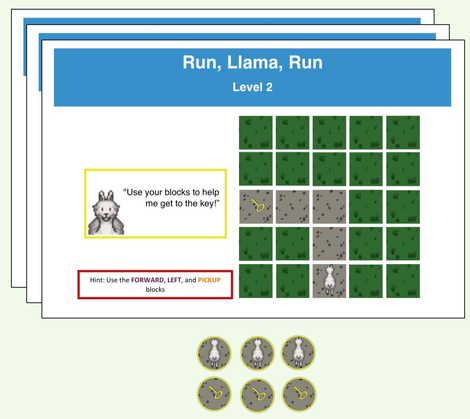
5. Run, Llama, Run

START WITH A CHALLENGE PROBLEM → CREATE CODE → OBSERVE SOLUTION

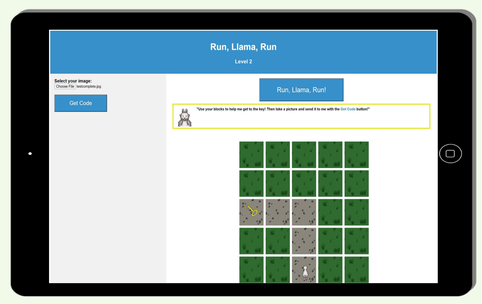
K-5 students

Tangible Code Creation
(paper or 3D printed blocks)

Tangible Solution Observation
(paper challenge cards and token)



Digital Solution Observation
(Simulation of solution on digital device)



6. Evaluation Plan

- In-classroom study with 2 classrooms, with students separated into small groups
- Each classroom will be given a different version of the game
- Students will be observed by volunteers
- A short survey will be given to the students and an interview will be conducted with the teachers

RESEARCH QUESTIONS:

1. *Is there an observable difference in the completion of in-game learning objectives between the two Run, Llama, Run interfaces?*
2. *Is there an observable difference in engagement and collaboration?*
3. *Did the children find the game fun, and would they play the game again?*

7. References

[1] F. Kalelioğlu. 2015. A new way of teaching programming skills to K-12 students: Code.org. Computers in Human Behavior 52 (2015), 200–210.

[2] D. Weintrop. 2019. Block-based programming in computer science education. Communications of the ACM, 22-25.

Available for download at:
https://github.com/seer-lab/Run-Llama-Run

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