

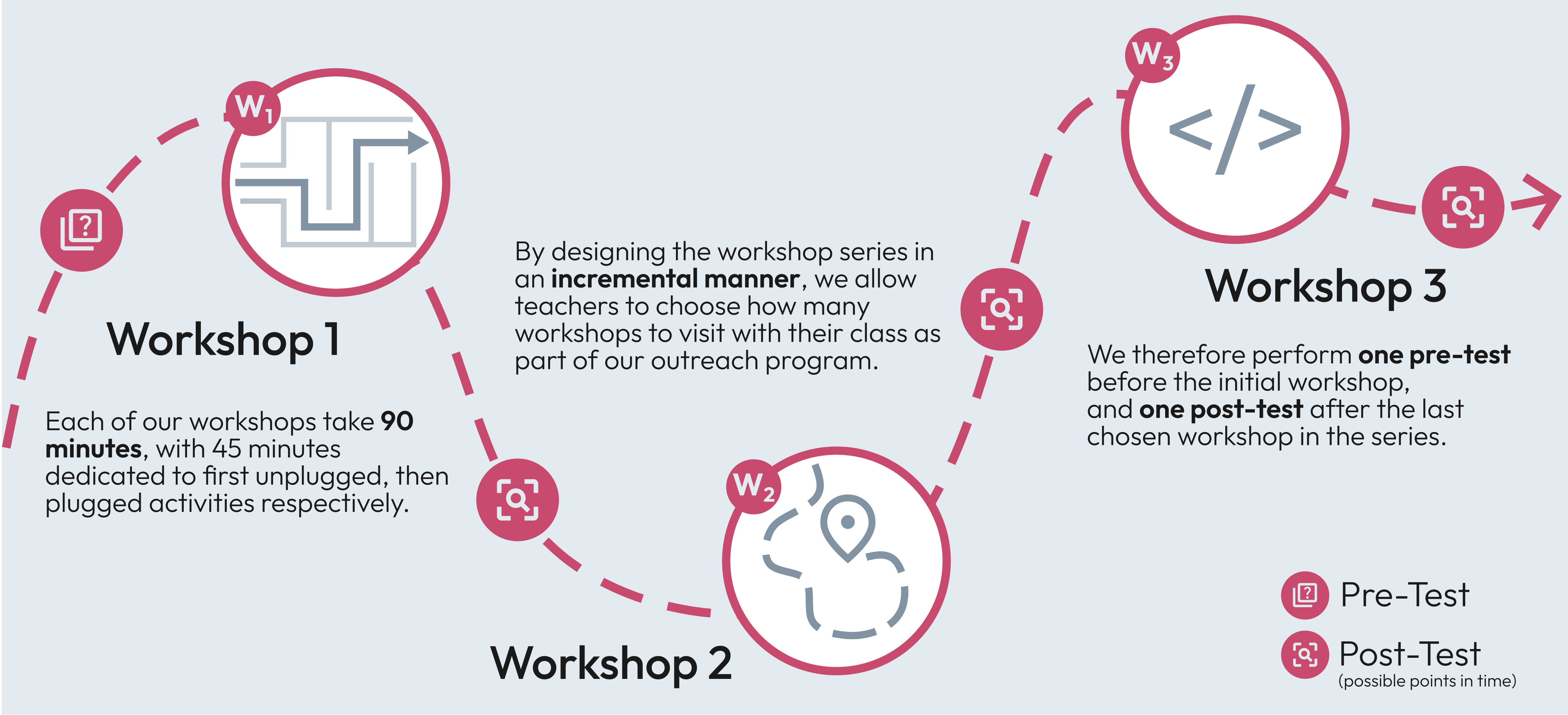
Introduction

Algorithmic principles are fundamental to computational thinking, yet teaching them effectively to K-12 students remains a challenge. Recent research [1] shows that the usage of "unplugged" (non-digital) activities to teach such content leaves learners with persistent misconceptions. Specifically, students tend to over-emphasize properties like **repetition**, while **finiteness** and **definiteness** are severely underrepresented.

To bridge this gap, we propose a hybrid strategy that pairs unplugged approaches with **DevOland**, a gamified, digital learning platform. By employing this strategy in a three-part workshop series, we investigate whether our approach reduces aforementioned conceptual errors and improves retention more effectively than relying on unplugged-only approaches.

Workshops 3 (incremental design)	Format Hybrid (unplugged / plugged)	Duration 90 min. (45 min. per strategy)	Target K5 - K8 (ages 10 - 14)	Learning Platform DevOland (in-house development)
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Design & Implementation



Workshops

- W₁ Maze-Solving Algorithms**
 - Introduction: "Human robot"
 - Understanding & error correction
 - Follow-the-wall rule
 - Pledge algorithm, Trémaux' algorithm
- W₂ Path-finding**
 - Graph theory basics (nodes, edges, cost)
 - Depth-first vs. breadth-first
 - Dijkstra's algorithm
- W₃ Application & Creative Design**
 - CTF workshop with self-made maps
 - Algorithms tested for generality

DevOland

Extensible Architecture: DevOland uses a unified level interface paired with a modular design, enabling the effortless integration of new learning tasks.

Gamified Exploration: DevOland drives student motivation through gamified features (character customization, story & challenge modes) and fosters open-ended exploratory learning with a dedicated "Laboratory Mode".

The Island

In this challenge, take a close look at the structure of a maze and how the robot works! Your task is to decide whether the robot "Wall" reaches the target or not.



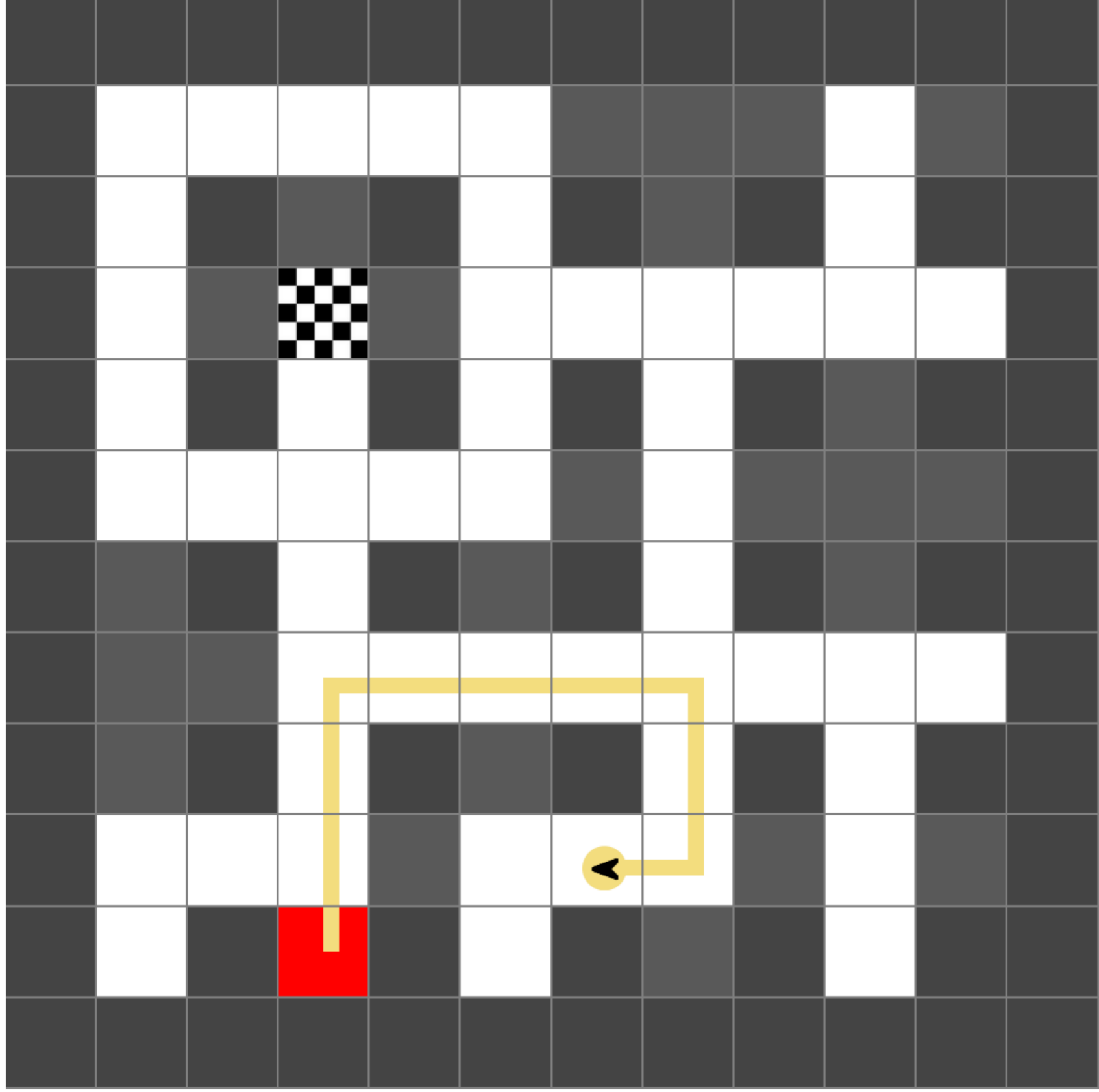
To view a description of what Wall does and the underlying algorithm, simply click on Wall above!

Do you think that "Wall" will reach the target in this labyrinth?

☐ Yes ☒ No

Start Simulation

Labyrinth

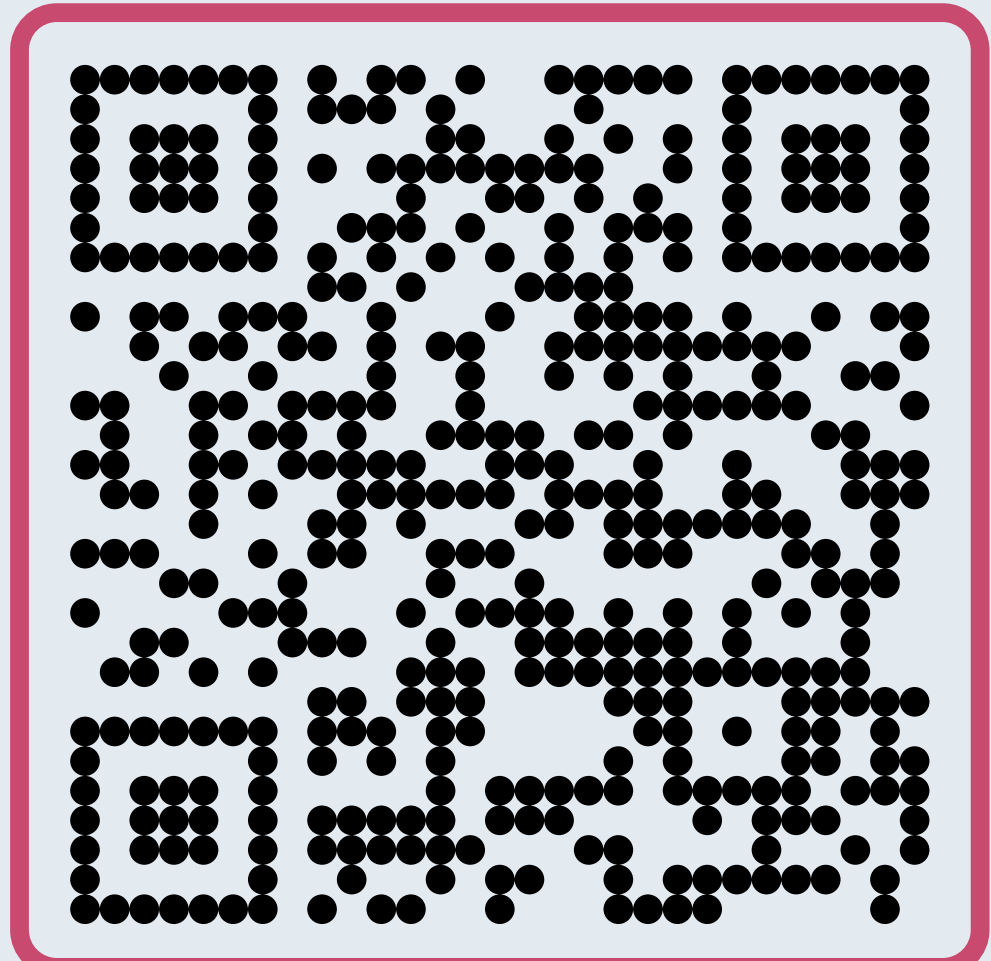


Research Goals

By reproducing the study of Landman and Kohn [1], we aim to answer the following research questions:

1. Does the hybrid approach reduce specific misconceptions regarding finiteness and definiteness?
2. How does the DevOland platform impact student engagement?

Further Information



Scan me!



Informatics

eduLAB



This work was supported by the Vienna Business Agency.

[1] Martina Landman and Tobias Kohn. 2024. "Something that Happens Each Day" - Students' Explanations of What Algorithms Are. In Proceedings of the 2024 on Innovation and Technology in Computer Science Education V. 1 (ITICSE 2024). ACM, New York, 199-205. <https://doi.org/10.1145/3649217.3653531>