

# Computational Modeling with Micro:bit in Teacher Education

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## INTRODUCTION

Teaching math through CM helps develop a rich understanding and new pedagogies (Gadanidis, 2015). Learning to teach math through coding requires knowledge and instructional experiences in both math and coding. (Gleasant and Kim, 2020).

These instructional experiences should promote mathematical modeling (MM) and computational modeling (CM) that represents real-world situations

Pre-service teachers face nuances and tensions in finding a balance between both.

## OBJECTIVE

To investigate the mediating role of technology in directing pre-service teachers' shifts of attention.

## RESEARCH QUESTION

What insight into PST's awarenesses of teaching CM can be revealed through their shifts in attention when exploring and modeling climate-related data with micro:bit®?

## METHODOLOGY

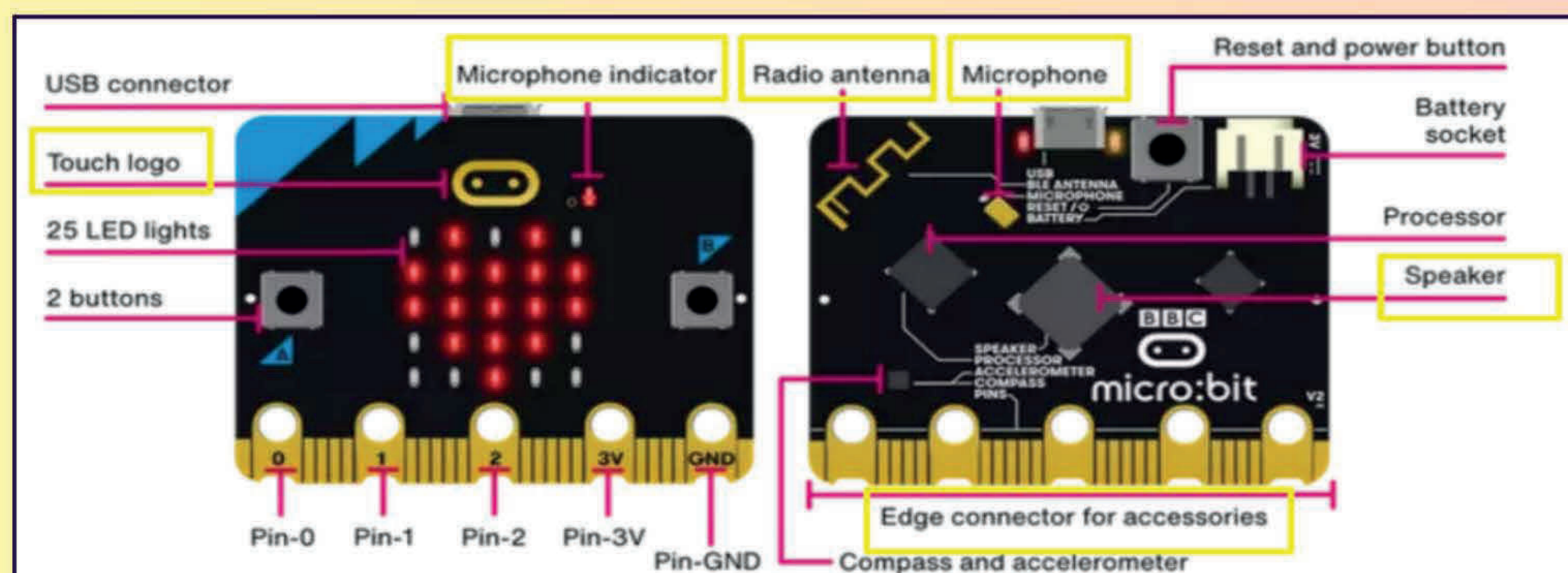
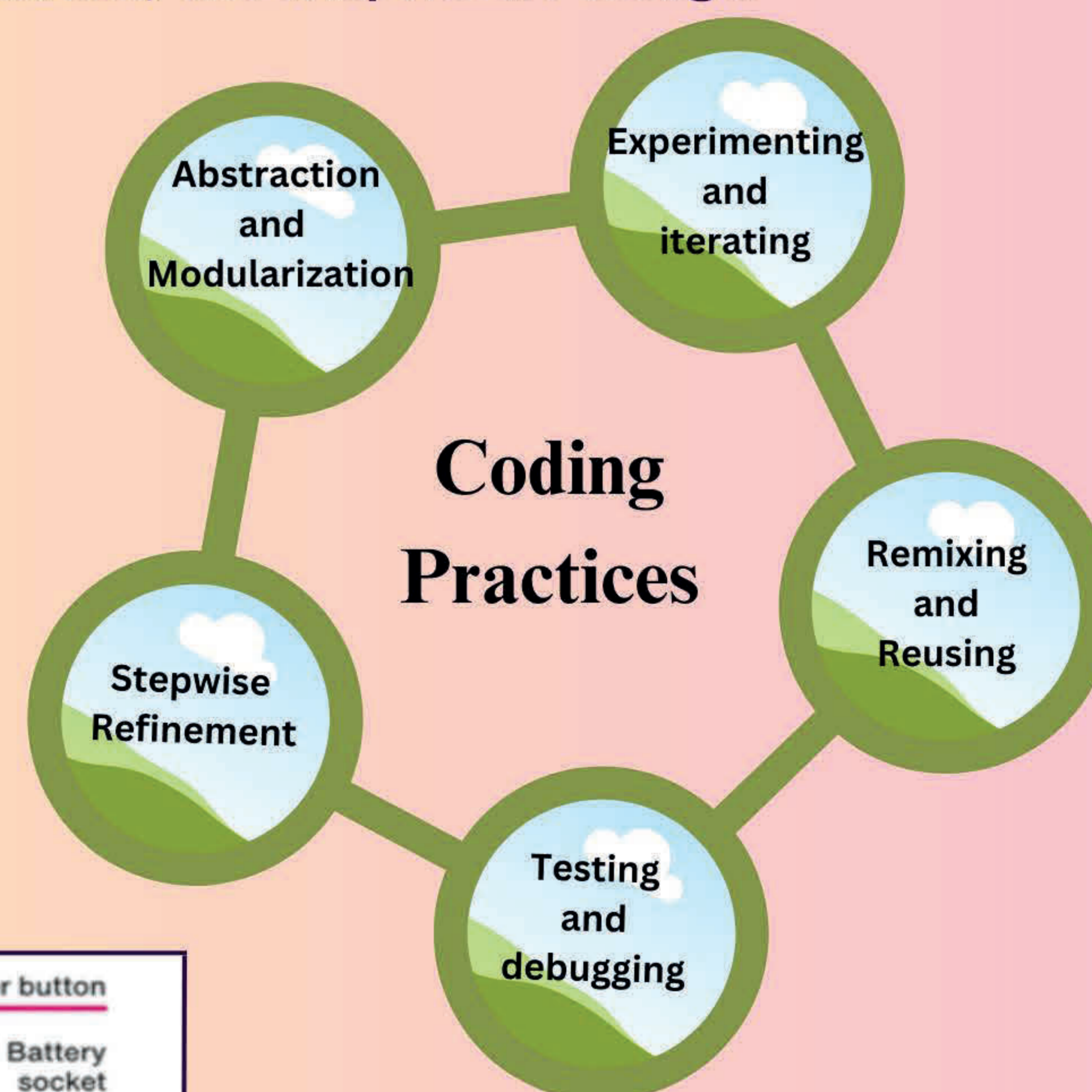
**Participants:** 36 Pre-service teachers enrolled in a coding education course.

**Procedure:** data were collected over a two-week period.

**Data Source:** Participants' codes and written responses to prompts.

**Task:** To collect and analyze data related to soil moisture, light, pollution, and temperature change.

"In many places, coding is being introduced in ways that undermine its potential and promise. If we do not think carefully about the educational strategies and pedagogies for introducing coding, there is a major risk of disappointment and backlash" (Resnick & Rusk, 2020, p.120).

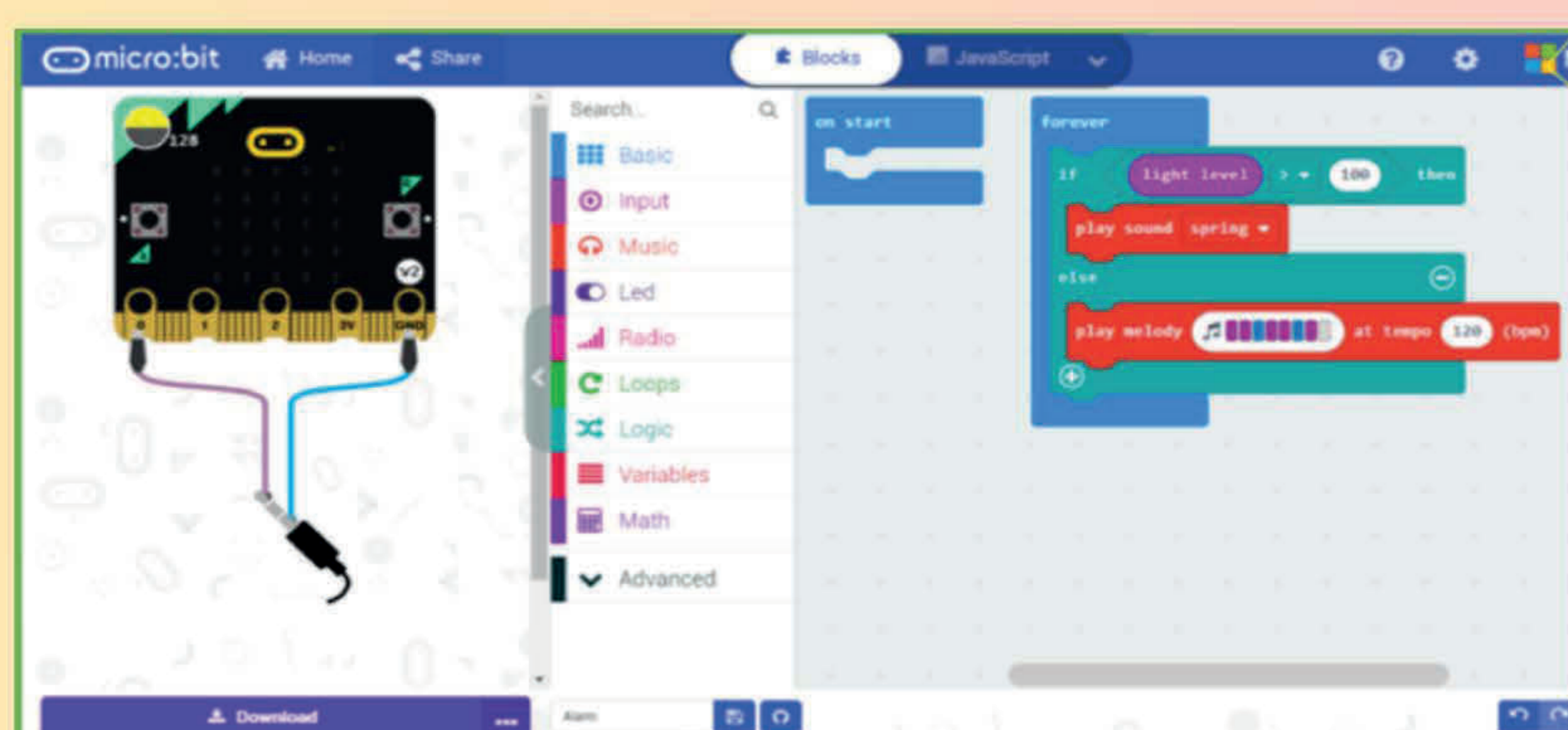


## Micro:bit® front and back view

The micro:bit® offers an authentic tool that can promote creativity and develop computational thinking and problem-solving in learners (Videnovik et al; 2018).



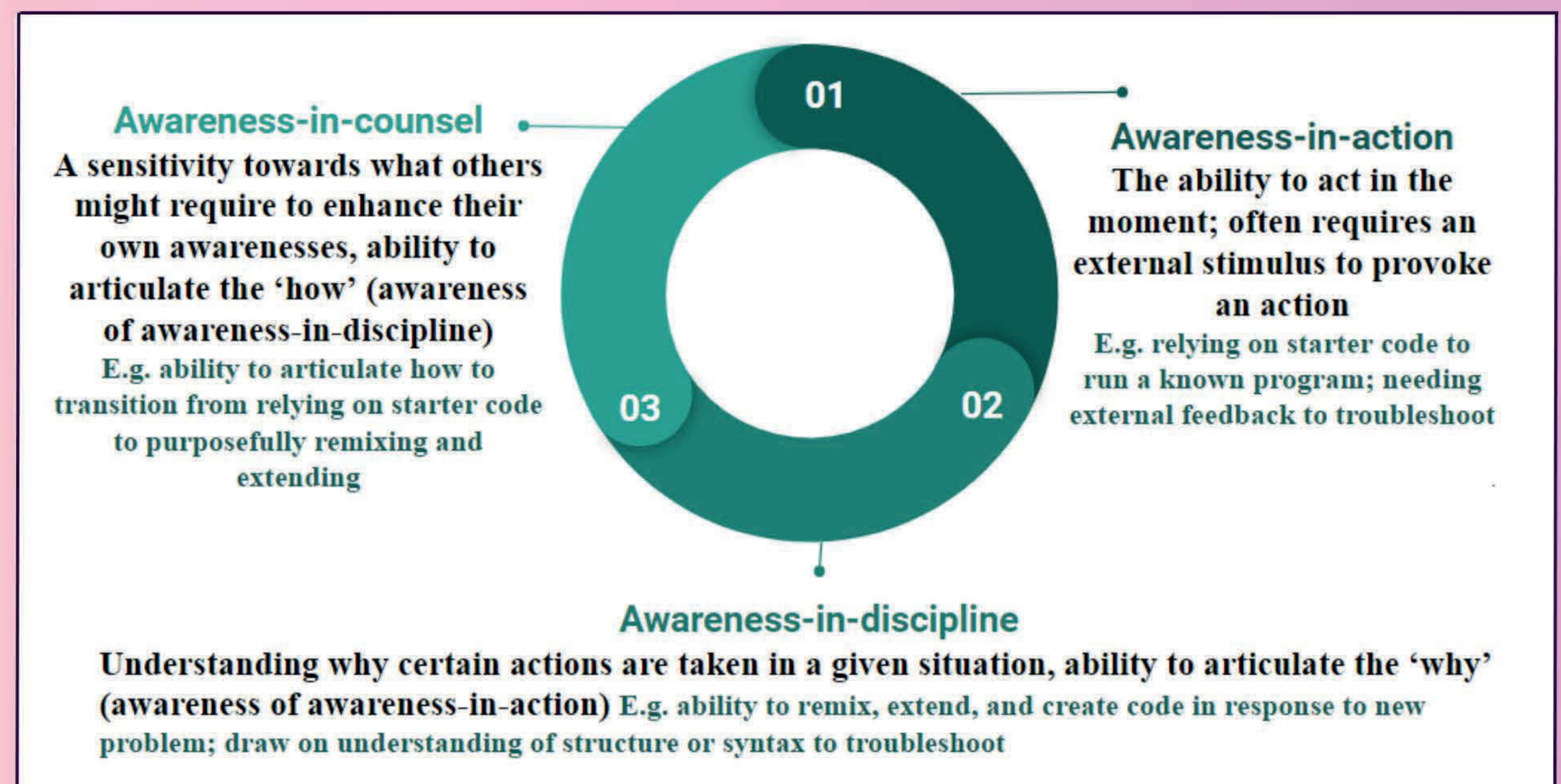
The Climate Action Kit



Block-based programming in micro:bit®

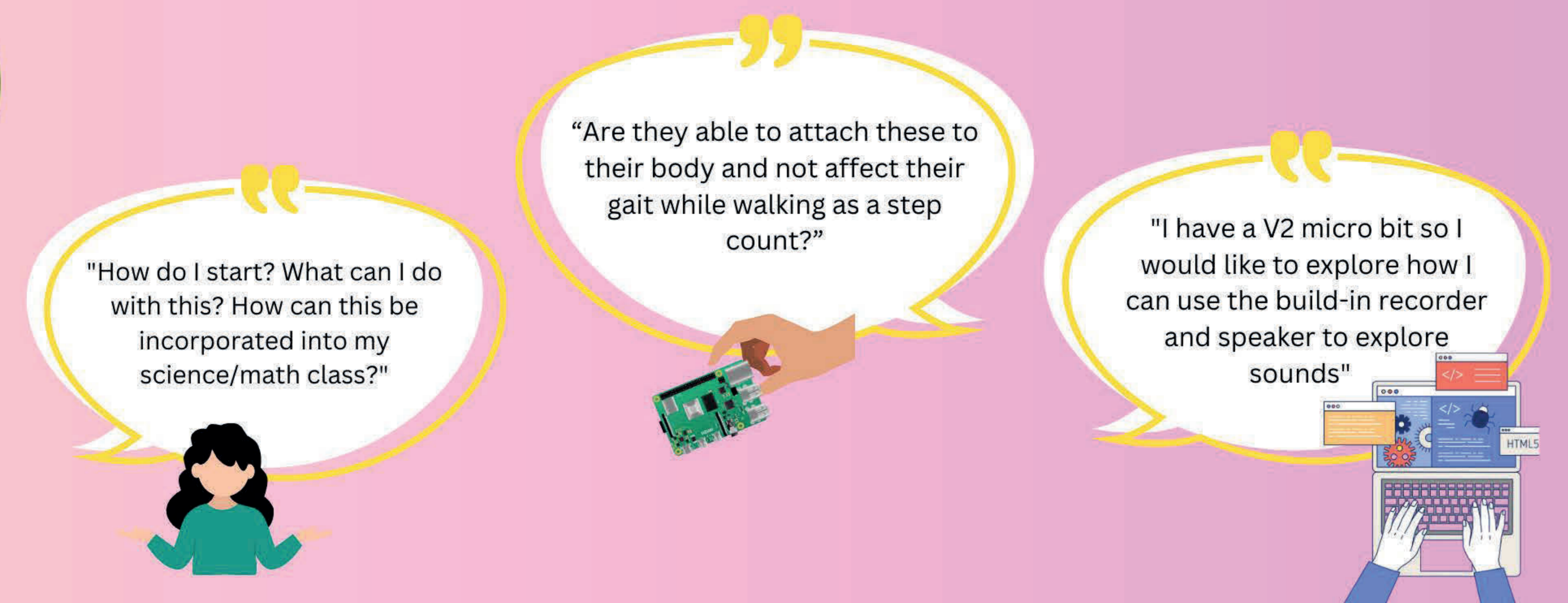
## THEORETICAL FRAMEWORK

- "Learning consists of shifts in the structure of attention: what is attended to and how" (p. 9).
- "Attention is crucial to what can be noticed, and what can be learned" (p. 14).



## RESULTS & ANALYSIS

Results indicate that PST's attention can reveal and be directed by their awareness of coding practices and their awareness of technology hardware.



Lilac	Awareness-in-action of technology	<ul style="list-style-type: none"> <li>• Focusing on the micro:bit and its functionality as a minicomputer. That is, what the technology could do for her practice.</li> </ul>
	Awareness-in-discipline of coding	<ul style="list-style-type: none"> <li>• Demonstrating coding practices such as remixing (the starter code), experimenting and testing (with the battery tester).</li> </ul>
Sky	Awareness-in-action of coding	<ul style="list-style-type: none"> <li>• Relying on a procedural step-by-step approach for creating the code</li> </ul>
	Awareness-in-discipline of technology	<ul style="list-style-type: none"> <li>• Focusing on the functionality and specific features of the micro:bit itself. That is, the technology's ability to combine with other devices.</li> </ul>

## CONCLUSION

Awareness for teaching CM involves awareness of coding and awareness of technology, which can co-exist in different forms. Participants' physical experiences with the micro:bit® influenced the focus of their attention and revealed underlying awarenesses for teaching. Our analysis suggests that when introducing physical technologies for teaching, teachers' attention may be influenced by their awareness of the specific technology and by their awareness of technology in general, and this can influence their attention toward (and away from) coding practices. We suggest a need for further research into the interplay amongst awarenesses for teaching when teaching mathematics through computational modeling.

## ACKNOWLEDGEMENT

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