How Perceptions of Programming Differ in Children with and without Prior Experience

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Abstract

We studied perceptions of 7-13 year-olds…

- Of **the activity of programming** in general
- Of **programming constructs** in particular
- And how they differ based on **prior experience**

This study goes beyond prior work by examining the perceptions of specific constructs in blocks-based languages among kids.

Background

Impact of Computing Perception in Kids

- Experience impacts perception[1]
- Perception impacts sustained interest[2]

Computing Perception and Experience

- New students hold misconceptions of computing[3]
- Children's perception disconnected from practice

Learning & Programming Constructs

- Research shows intuition differences by construct
- Perceptions can inform curriculum design[4]

Study Design

Context

- One-week game camp
- Individual & team projects
- 28 children, 7-13 years
- 46% (n=13) prior exp.

Data Collection

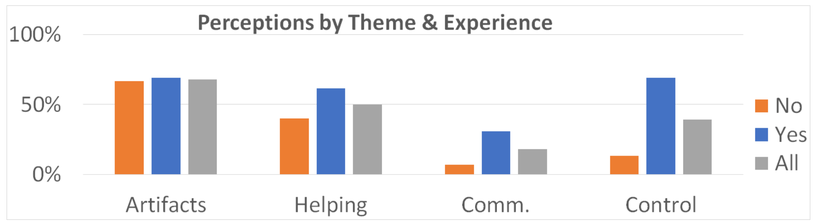
- One-on-one interviews
- General perception
- Construct perception
- Codes & themes

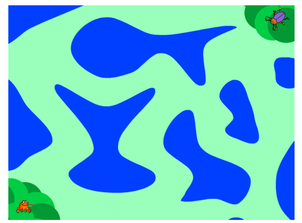
Findings

Activity Perception

- Most **with** & **without experience** connected programming to ***results*** (**artifacts** & **helping**)
  "Programming… is a way to create other items using technology to help the world."

- Those **with experience** also associated it with ***process and function*** (**communication** and **control**)
  "It [programming] is telling the computer what to do."

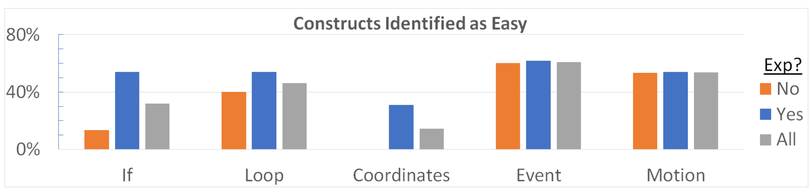




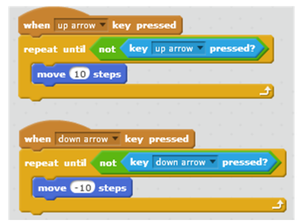
CS First Activity—Maze

Construct Perception

Students identified different constructs as **easy**…

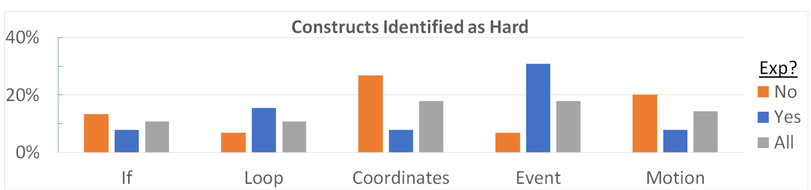


"I got them and they were kind of easy to do. I knew how to do them."

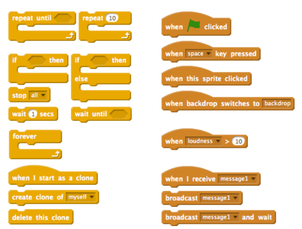


Sample Scratch Program Fragment

…and differed in those they identified as **hard** too:



"I thought the message ones were a little harder."



Construct Groups

Conclusions

Programming Activity

- Most students associated programming w/ results.
- **Experienced** students saw programming as an engagement, rather than just the result.

Programming Constructs

- Control constructs offer insight into differences in perceptions of **easy constructs** by prior experience:
  - Loops were easy for **everyone**
  - If-constructs were easy for the **experienced**
- **Difficult constructs** differed largely in terms of construct complexity and potentially exposure:
  - **Inexperienced** students found coordinate and math-based constructs difficult
  - The **experienced** identified event constructs

Takeaway of this Work

- Establishes contextual framing based on **results** helps to support sustained interest
- Provides insight into construct perceptions to assist leveling of instruction in constructs.

References

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[2] M. Biggers, A. Brauer, T. Yilmaz, Student perceptions of computer science: A retention study comparing graduating seniors with CS leavers, ACM SIGCSE Bull. 40 (2008) 402–406.
[3] S. Yardi, A. Bruckman, What Is computing? Bridging the gap between teenagers' perceptions and graduate students' experiences categories and subject descriptors, in: Proc. Third Int. Work. Comput. Educ. Res., 2007: pp. 39–49.
[4] S. Grover, R. Pea, S. Cooper. Remedying misperceptions of computer science among middle school Students. In Proc. 45th ACM Tech. Symp. Comput. Sci. Educ, 2014: pp. 343-348.