Use of Explicit Instruction is helpful in Reducing Program Reasoning Fallacies in Elementary Level Students

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Laws of Kodu

Second Law of Kodu

Third Law of Kodu

Summary

This poster presents results from a study which analyzed the role of explicit instruction in the form of ‘laws of computation’ in cultivating elementary school (4th and 5th graders) students’ ability to reason about programs using Microsoft Kodu Game Lab.

We used pre-tests to record students’ default models of reasoning about programs and then used post-tests to measure the effectiveness of intervention by noting students’ reasoning responses on a similar program.

Our findings indicate that by default students reason sequentially about program execution which can be incorrect in situations like parallel rule execution. We also found that the use of explicit instruction in the form of ‘laws’ is helpful for students to refine their understanding of program execution and to improve their reasoning ability.

Highlights

- Students actively apply analogical reasoning models accumulated through their day-to-day experience in reasoning about programs.
- While students cannot be prevented from using analogical reasoning, the use of explicit instruction can help in molding a student’s reasoning wherever analogies do not hold true.

Study Design

- Mixed method research
- Pre and post assessments, think-aloud interviews used to study reasoning
- 18 participants, 4th and 5th grade students (12 boys and 6 girls)
- 16 out of 18 students indicated that they had prior programming experience

Week - 2

Results

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Pre and Post assessment results in Week 2

Conclusion

- Students have analogical mental models for reasoning about programs
- Use of laws is effective in correcting program reasoning
- Students referred the laws explicitly while reasoning about the execution of the programs

Week - 3

Results

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Pre and Post assessment results in Week 3