Abstract

At what age are students ready to learn recursion? This question has long been debated in Computer Science education. Anecdotal evidence indicates that many university students struggle with this so-called sophisticated concept. However, we have seen evidence that elementary school students are able to apply recursive solutions to problems given the appropriate level of abstraction. These students will be able to apply recursive solutions to assigned tasks.

Lesson Schedule

Week 2
Visual Recursion

Week 3
Sierpinski's Carpet 
& Line-up

Week 4
Chasing Animals

Week 5
Unplugged Toys

Week 6
Microworlds

Week 7
Towers of Hanoi

Evaluation Techniques

• Clicker: We will use electronic clickers for question and answer sessions aimed to test comprehension.

• Sorting Pre-test and Post-test: The same sorting exercise will be given to the students in week 1 and in week 8 to compare their understanding at the beginning and the end of the teaching period.

• Surveys: Example survey questions include the following: What do you think recursion is? What do you find difficult? What don’t you understand?

• Teacher observations: General observations from the instructors about how each student is progressing.

• Screen capture software, video & audio recording: To document the students’ problem solving strategies, along with the difficulties they encounter.

Hypothesis

We propose that students as young as 12 will be able to understand recursive concepts given an appropriate level of abstraction. These students will be able to apply recursive solutions to assigned tasks.

References


Timeline of Related Work

1982
Bhuiyan, Greer and McCalla

• Recursion is understood in shorter loop, stack, sorting, and model reduction.

1990
George

• A graphical tool to help students visualize mental models of recursion

2000
Bergin et al.

• Divide and conquer to teach first year students.

2001
Tung and Chang

• A visual accompaniment to Scheme

2008

References