



# Computational Thinking: Assessment in Alice

Class Overview

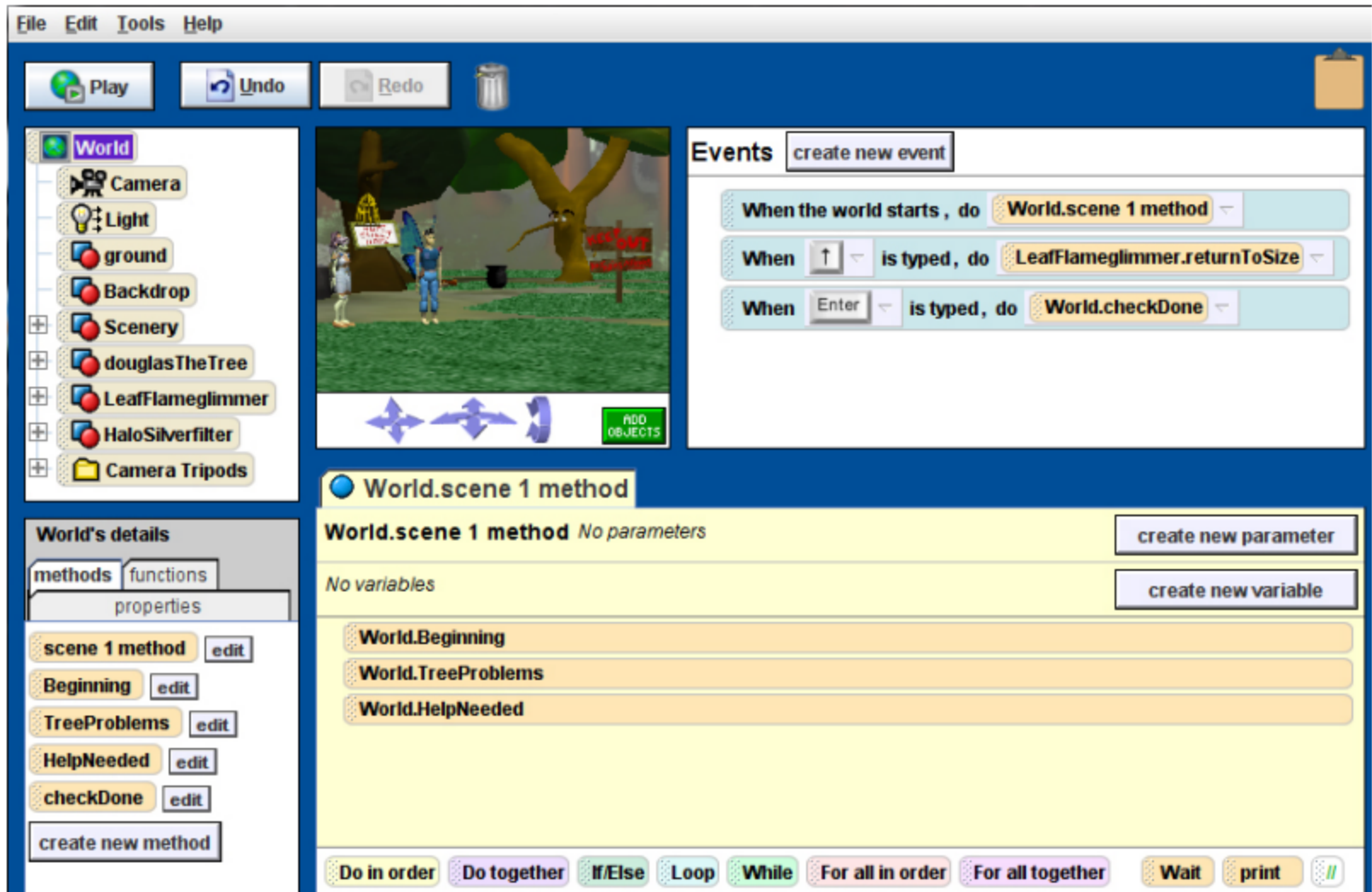


# The Fairy Performance Assessment

- How do we assess Computational Thinking?
- 2 year study using Alice with Middle Schoolers
- **Premise:** Debug faulty programs based on design patterns learned in class



# Alice





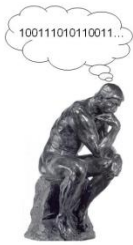
# Purpose

- Assess Knowledge
- Why is there variation among students?
  - -> Strengthen efforts to engage K-12 in CT



# Demographic Data

- **325 students** - 311 assessed
- 60% in-school
- 36% female
- 52% white, 37% latin[oa]



# Other Factors

- Age,
- Gender,
- Race/Ethnicity,
- Language,
- Parents computer usage,
- Parental education levels,
- Grades,
- Favorite subject
- **Confidence with Computers,**
- Attitude towards Computers,
- Frequency and Type of Computer Use,
- Simple Alice Content
- Attendance Data,
- **Hours spent paired programming**



# Semester Protocol

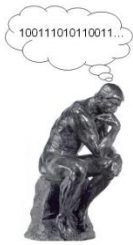
## Challenges

- \* First Half
- \* Self-paced
- \* 11 + 6 bonus
- \* Debug programs

## Free Design

- \* Second half
- \* Complete control

## Fairy Assessment



# Fairy Assessment





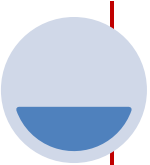


# Computational Thinking Definition

- “Thinking Algorithmically”
- “Making effective use of Abstraction and Modeling”
- ~~“Considering and Understanding Scale”~~



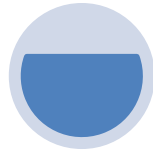
# Assessment Progression



## Use

First Fairy Walks into Forest

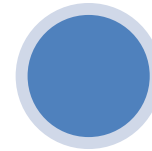
*Manipulating Parameters*



## Modify

Fairy regrows when key is pressed

*Removing/Adding Instructions*



## Create

The two fairies escape

*Coding their own method, plus manipulating and using*

- “complex conditionals”,
- “methods with multiple parameters”, and
- event handling



# Results

- Paired Programming -> Better results
- More computer usage -> Better results
- Higher grades -> better results
- Confidence with Computers -> better results
- ...



# More important results

- **Assessment was motivating** (90% return rate)
- Claim that it was positively correlated with another assessment of content knowledge
  - *But no details provided!*



# Criticisms

- Very narrow definition of CT
- Only focused on programming
- How do we know it measured anything?



# Mediated Transfer: Alice 3 to Java

- 2 year study of CS1 to Java
- Eclipse Plugin to convert Alice code to Java
- Exam scores went up ~20%
- **Bridging** vs. Hugging