

# **Comparing the Impact of Professional Learning in Coding and Computational Thinking for K-6 Teachers**

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## My Research Interests

- Professional Learning (PL) that supports teachers implementing Digital Technologies curriculum
- Focus of my PhD project is understanding how Stage 3 NSW teachers learn to apply Coding and integrate it into different KLAs after participating in PL centred on Scratch
- Will present some preliminary results from my research on the *Coding in Stage 3* program

## **Coding in Stage 3 Program**

- First phase of my PhD project: PL run over 10 weeks
- 20 hours of face-to-face tutorials + 10 hours of homework
- 42 teachers completed the program in total
- 2 streams: **ScratchMaths** and **Coding & STEAM**
- 15 in **ScratchMaths** and 27 in **Coding & STEAM**

## **Coding in Stage 3 Research**

**To what extent do Stage 3 teachers that have participated in different PL streams (ScratchMaths and Coding & STEAM), differ in their:**

- 1. Gain in understanding of CT concepts**
- 2. Change in self-efficacy, with respect to teaching CT**
- 3. Approaches for integrating Coding & CT across KLAs**
- 4. Pedagogical practices when teaching Coding & CT**

# ScratchMaths

- Adapted from the UCL ScratchMaths<sup>2</sup> resources
- Focuses on teaching Coding alongside Maths
- **Geometry, Measurement, Algebra, etc.**



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<sup>2</sup> <https://www.ucl.ac.uk/ioe/research/projects/scratchmaths>

# Coding & STEAM

- Adapted from the Creative Computing Curriculum Guide<sup>1</sup>
- Linked Coding to **Creative Arts, English, Maths, Sci & Tech**
- Each unit of guide linked to KLA (e.g. **Stories to English**)



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<sup>1</sup> <http://scratched.gse.harvard.edu/guide/>

## What I Measured (Pre + Post)

- Quiz to measure key computational concepts<sup>3</sup>:  
**Sequences, Loops (*repetition*) and Conditionals (*branching*)** before and after 10 weeks of PL
- Teachers' Self Efficacy in Computational Thinking (TSECT)<sup>4</sup>
- Also asked about teachers' plans to integrate Coding into different KLAs (will be explored further in Phase 2)

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<sup>3</sup> Brennan, K., & Resnick, M. (2012). New frameworks for studying and assessing the development of computational thinking

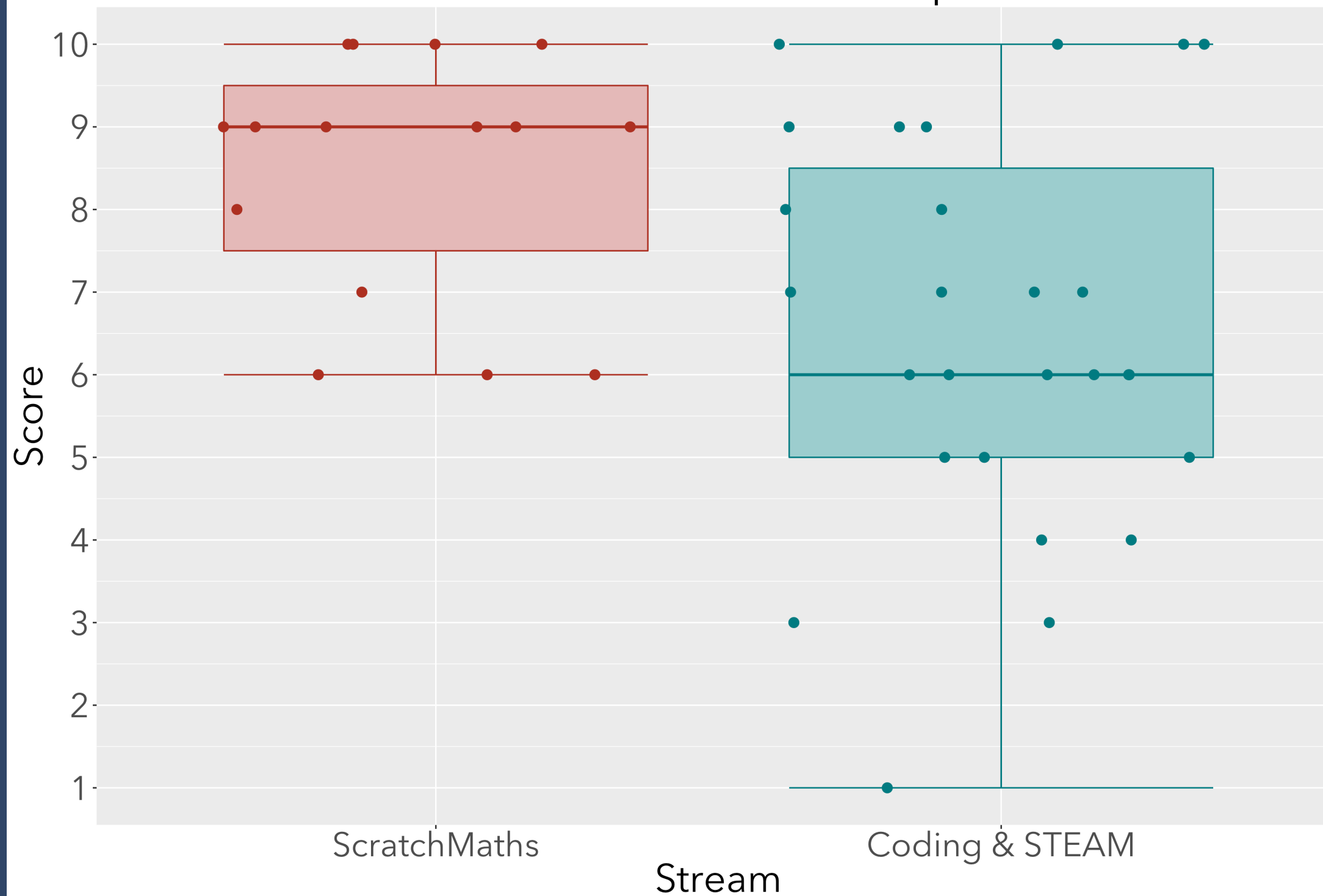
<sup>4</sup> Bean, N., Weese, J., Feldhausen, R., & Bell, R. S. (2015). Starting from scratch: Developing a pre-service teacher training program in computational thinking

# Understanding of Computational Concepts

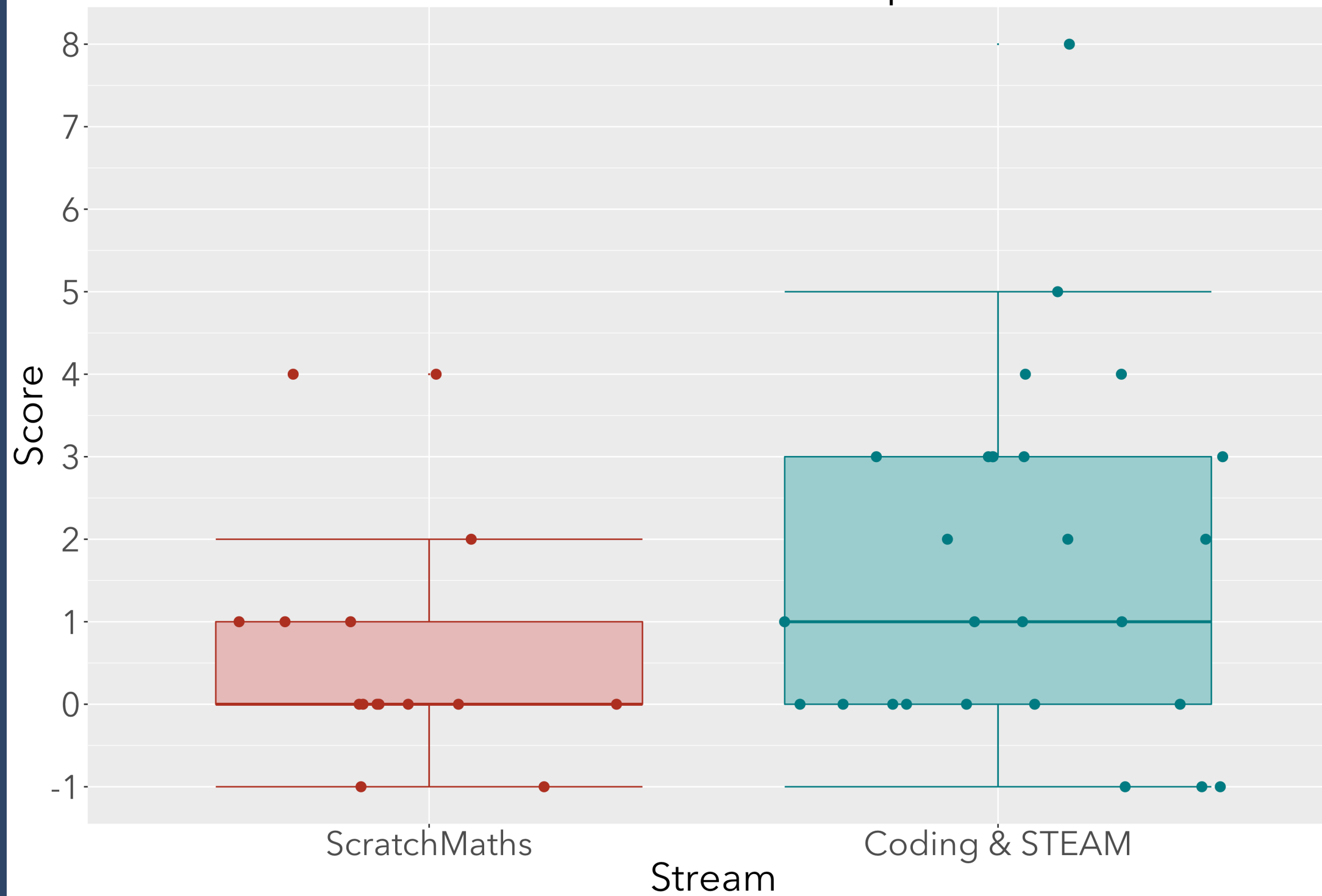
- Sequences
- Loops
- Conditionals



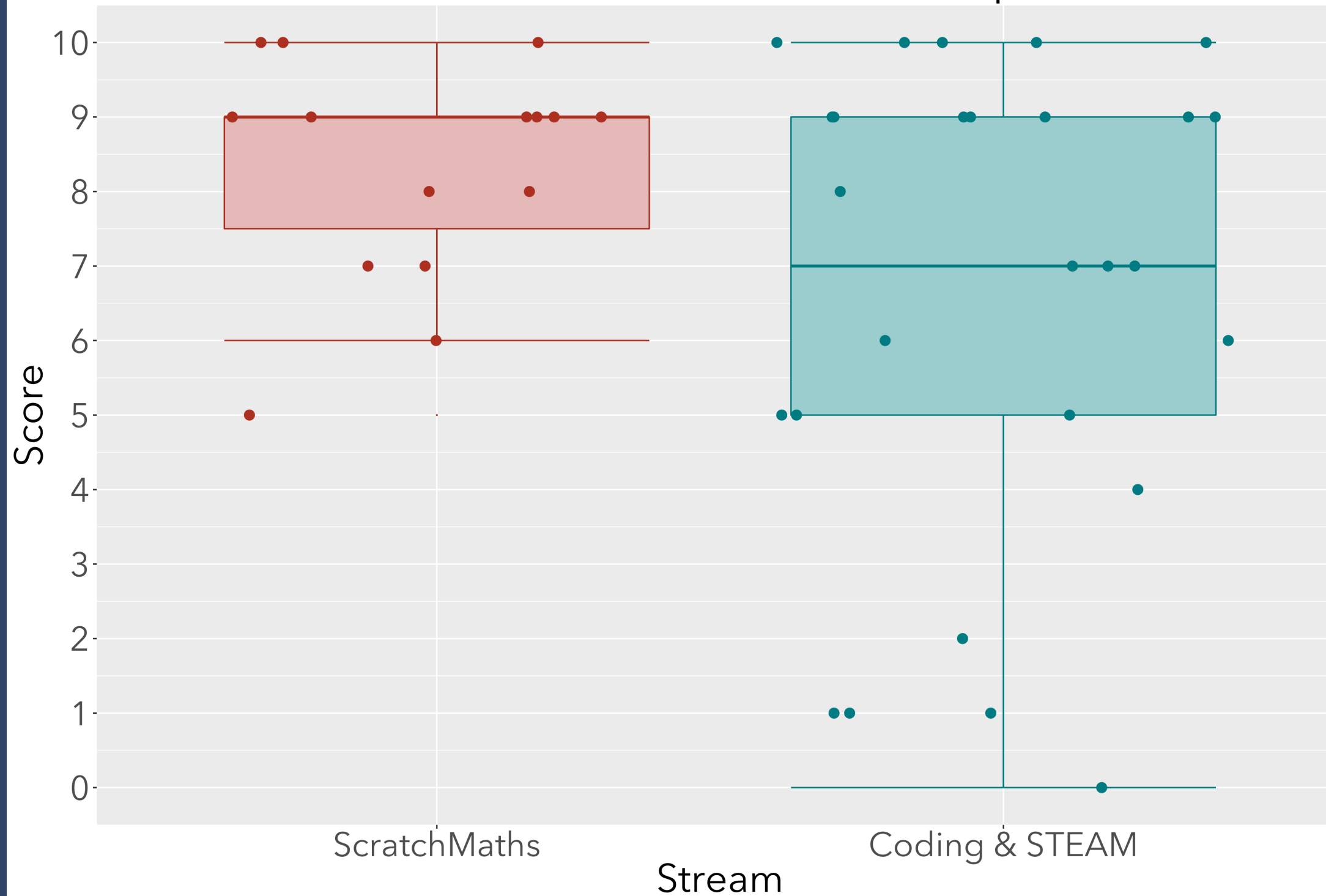
Pre-test Results for Quiz: Sequences



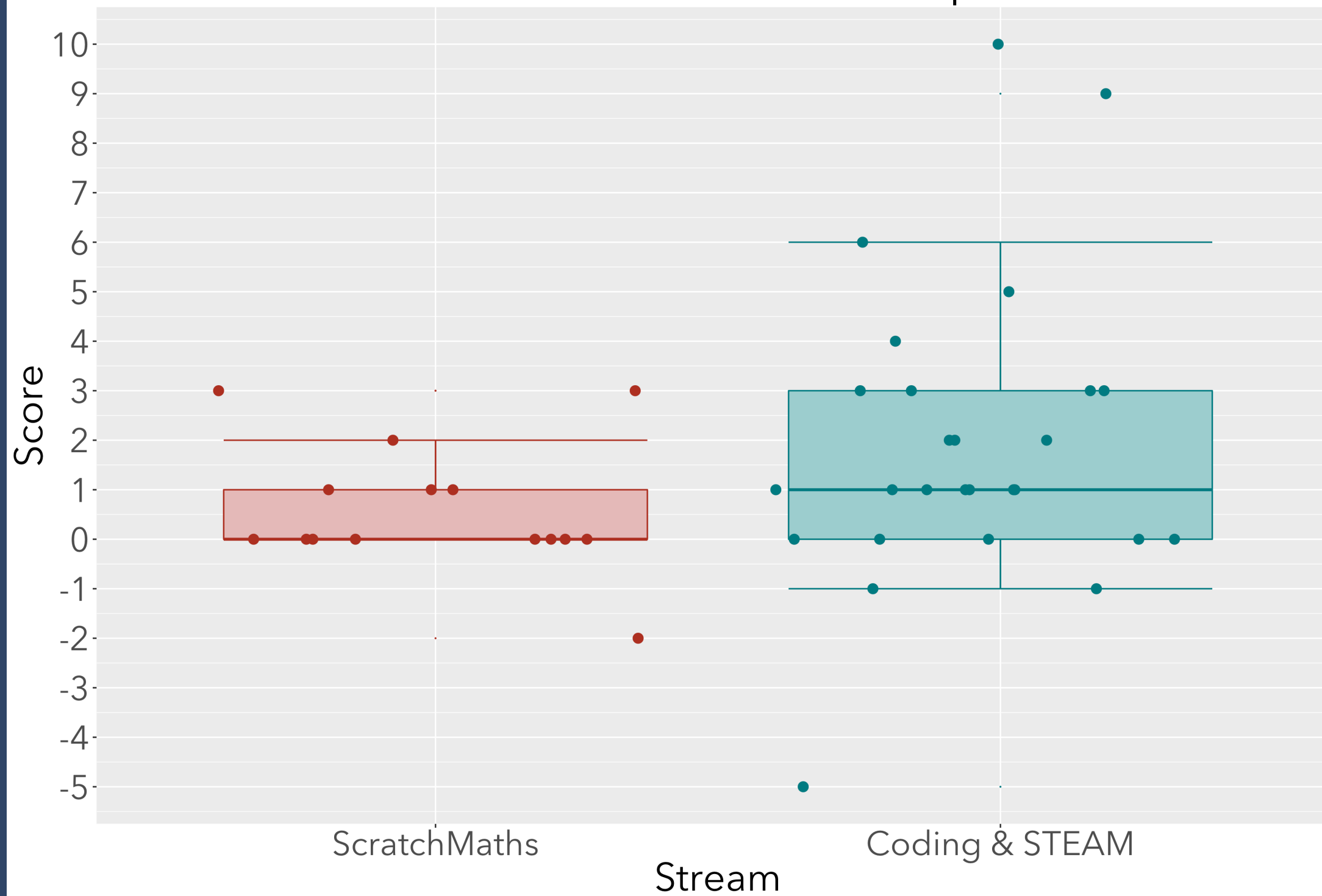
# Gain in Quiz Results: Sequences



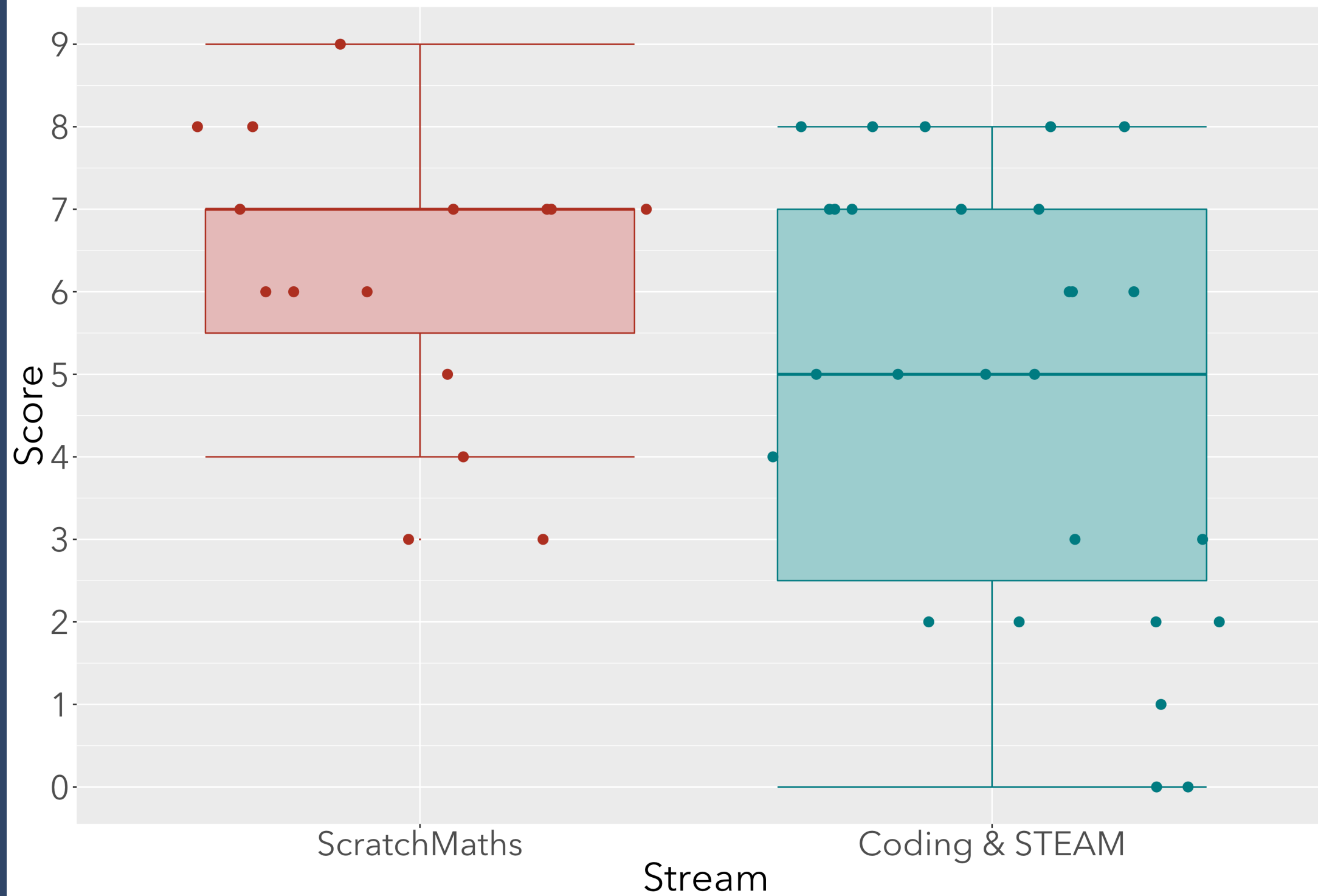
Pre-test Results for Quiz: Loops



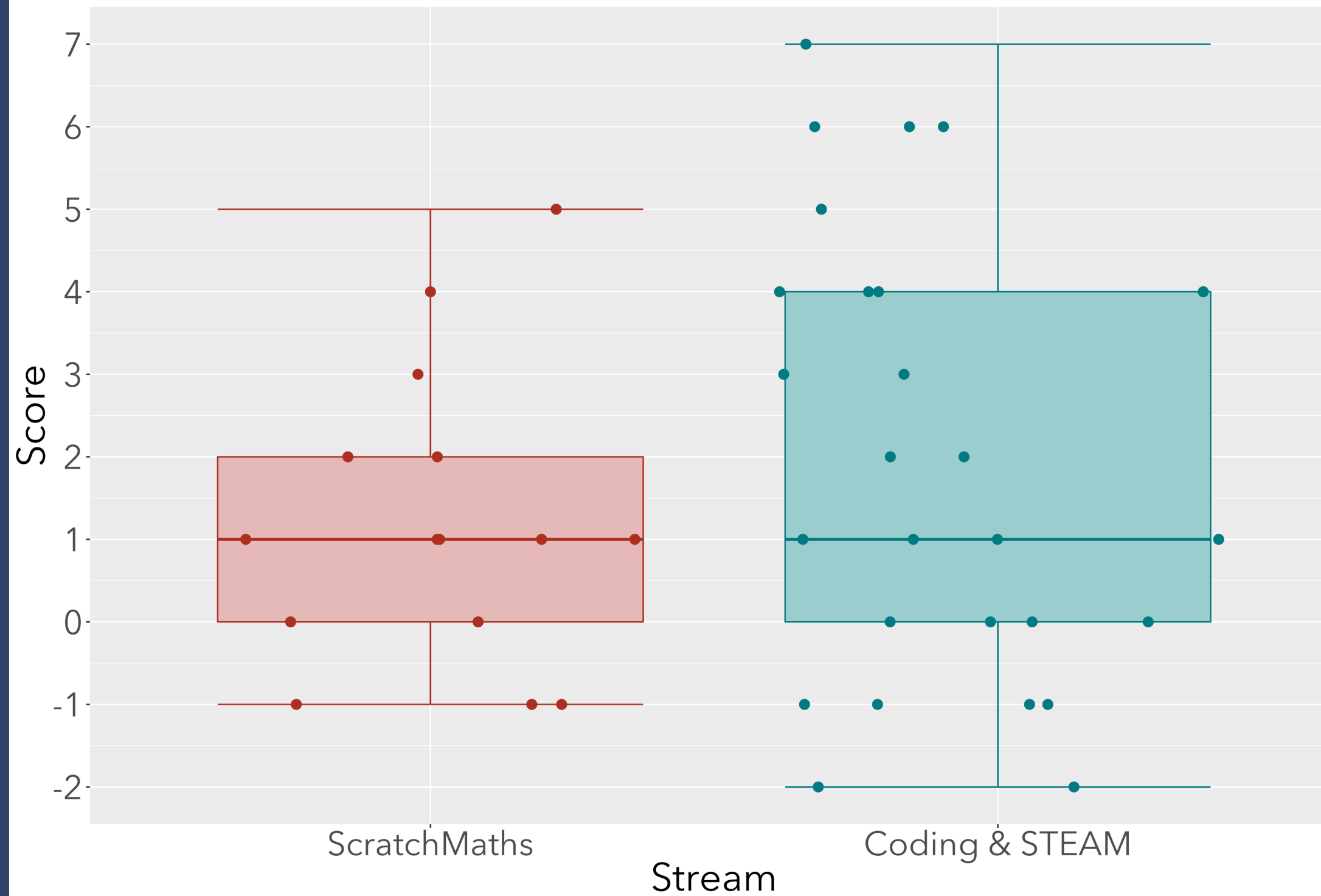
## Gain in Quiz Results: Loops



Pre-test Results for Quiz: Conditionals



## Gain in Quiz Results: Conditionals



## **Preliminary Analysis of Concepts**

- Non-parametric tests used to compare streams' gains in understanding: **Sequences, Loops and Conditionals**
- No real difference found between the two streams' gains
- ScratchMaths stream scored higher on all of the concepts in pre-test
- Group sizes were different (15 in **ScratchMaths** vs 27 in **Coding & STEAM**)

# Teachers Self Efficacy in Computational Thinking (TSECT)

- 14 different TSECT questions, rated on a scale of 0-100
  - 0 = I cannot do
  - 50 = I moderately can do
  - 100 = Highly certain I can do
- Teachers generally rated themselves very low (except for: *"In my classes, I can promote a positive attitude towards Coding."*)



## **Preliminary Analysis of TSECT**

- I have conducted preliminary analysis of TSECT
- Most teachers did improve on all TSECT measures
- Will do further analysis in coming months
- Have also asked these questions in recent 2-day workshop and aim to analyse this data later in 2018

# Implications

- Preliminary results suggest that teachers from 2 streams did not differ in their gains in CT concepts or self efficacy with respect to CT
- Many of the teachers had low self efficacy but PL did make them feel a lot more confident
- If a school/teacher has the choice between PL that focuses on Coding + one KLA vs Coding + multiple KLAs, which one should they choose?

# Implications

- Will the choice of PL have an impact on how teachers integrate Coding across KLAs?
- Do Stage 3 teachers only need some Coding knowledge and experience to find links between Coding and outcomes in different KLAs?
- I hope to find out more about this in Phase 2 of my project

## **Future Work**

- Interviews and observations of teachers that attended PL
- Further analysis and completing my thesis (mid-2019)
- Development of different surveys to aid with evaluation (of PL and to support teachers with assessment)
- Running similar PL and research on a larger scale