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 <u>UCL ScratchMaths</u>[2] resources

- Focuses on teaching Coding alongside Maths

- **Geometry**, **Measurement**, **Algebra**, etc.

[2] https://www.ucl.ac.uk/ioe/research/projects/scratchmaths

Coding & STEAM

- Adapted from the <u>Creative Computing Curriculum Guide</u>[1]

- 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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[1] http://scratched.gse.harvard.edu/guide/

What I Measured (Pre + Post)

- Quiz to measure key **computational concepts**[3]: **Sequences**, **Loops** (*repetition*) and **Conditionals** (*branching*) before and after 10 weeks of PL

- Teachers' Self Efficacy in Computational Thinking (TSECT)[4]

- Also asked about teachers' plans to integrate Coding into different KLAs (will be explored further in Phase 2)

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[3] Brennan, K., & Resnick, M. (2012). New frameworks for studying and assessing the development of computational thinking

[4] Bean, N., Weese, J., Feldhausen, R., & Bell, R. S. (2015). Starting from scratch: Developing a pre-service teacher training program in computational thinking
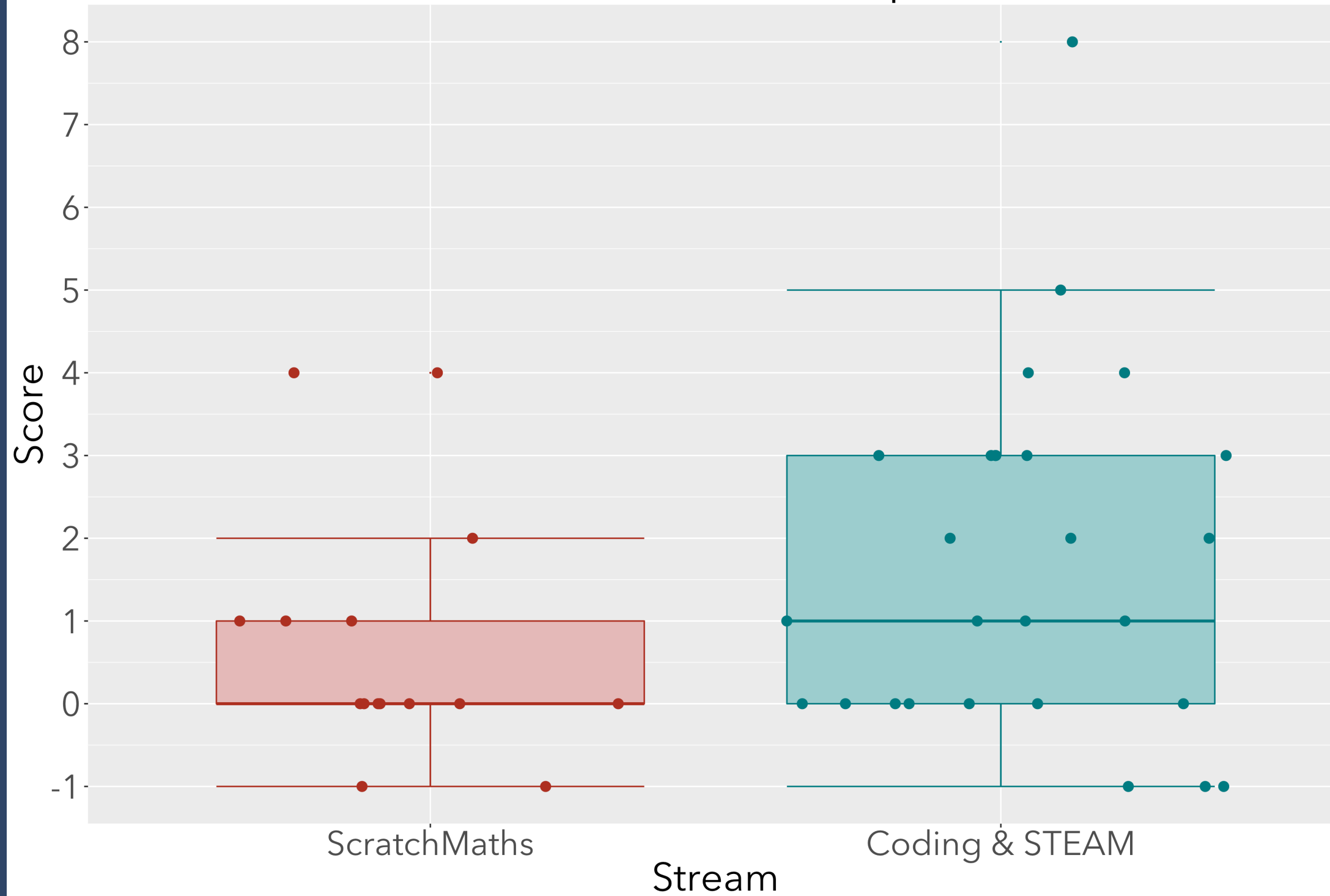
Understanding of Computational Concepts

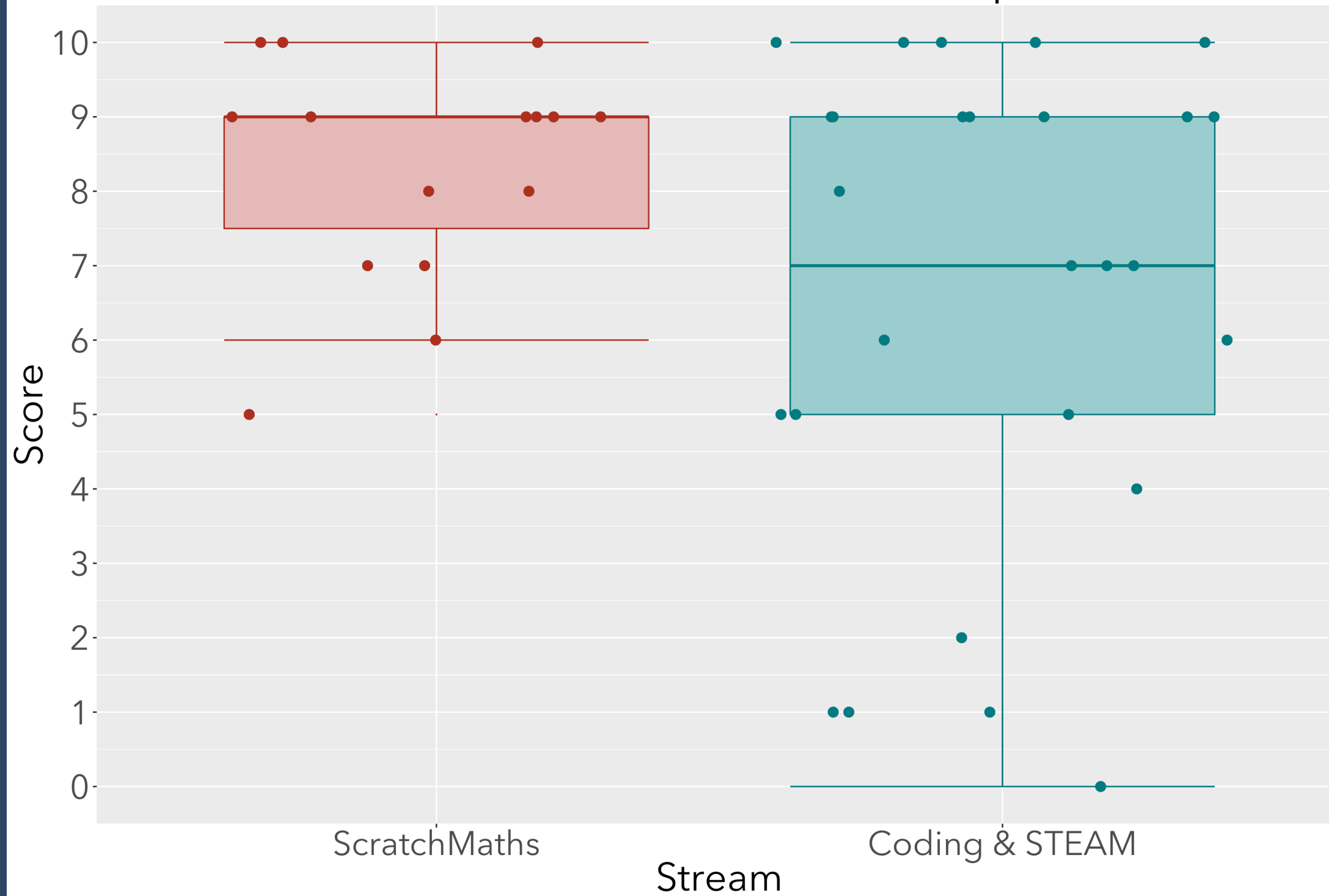- Sequences

- Loops

- Conditionals

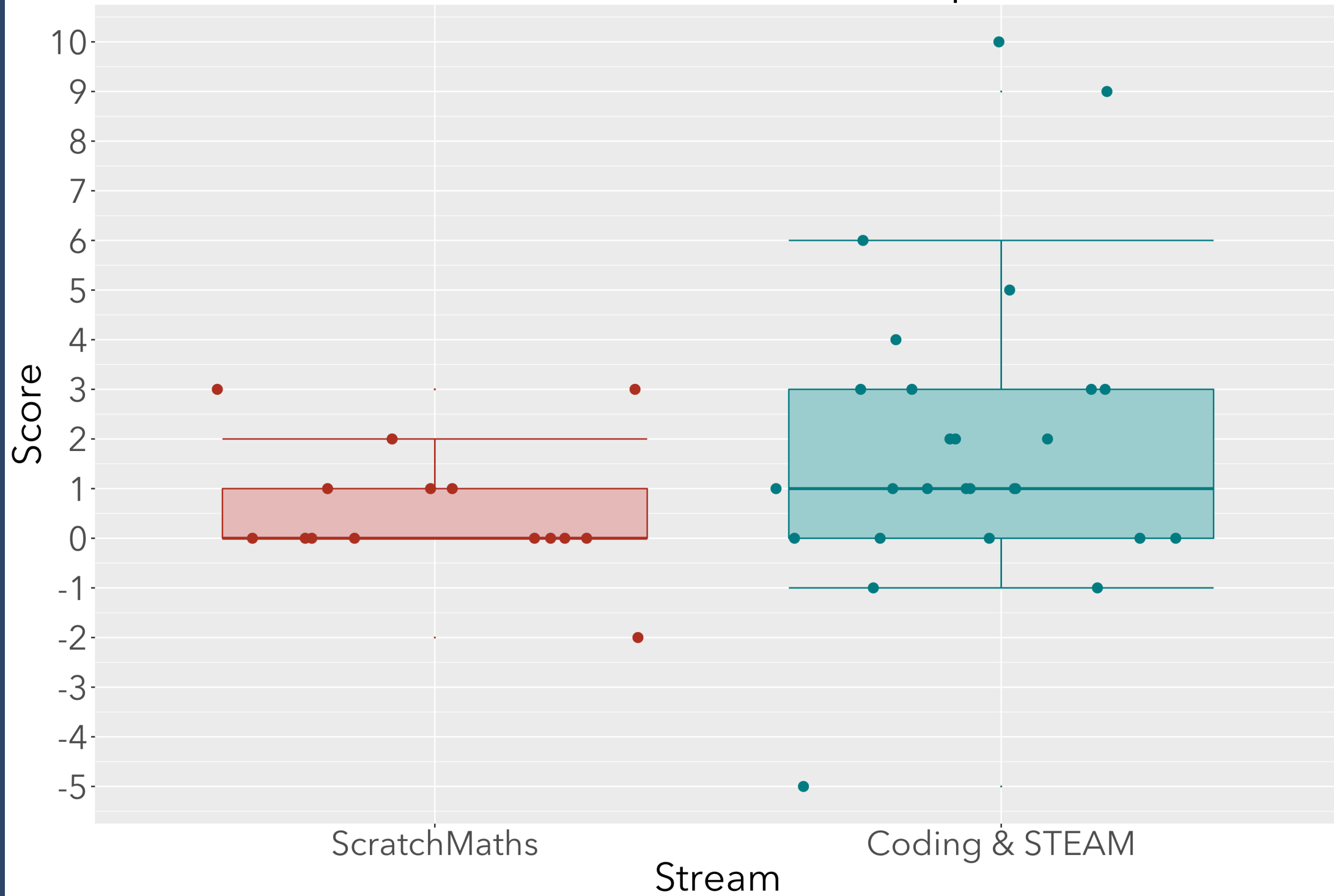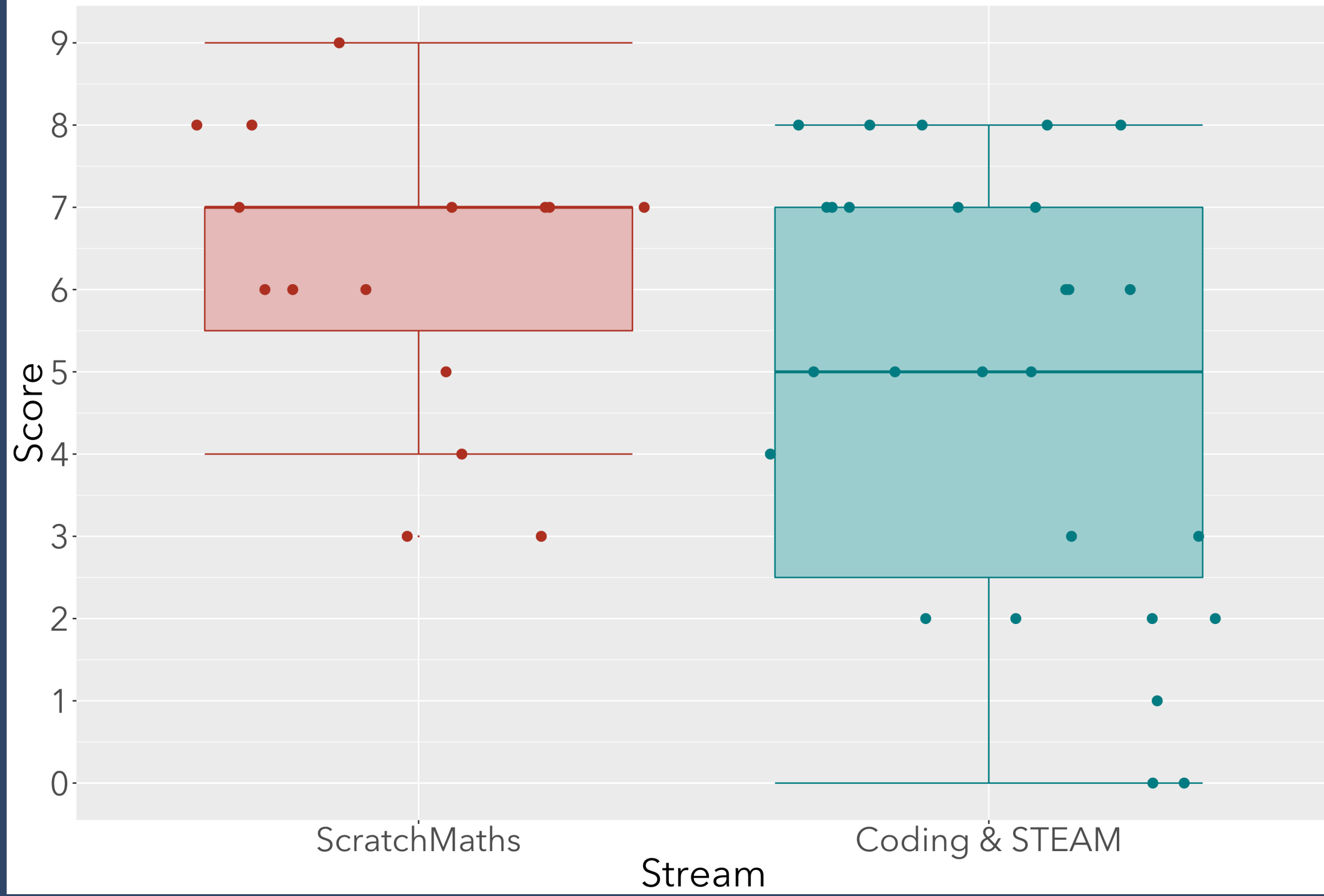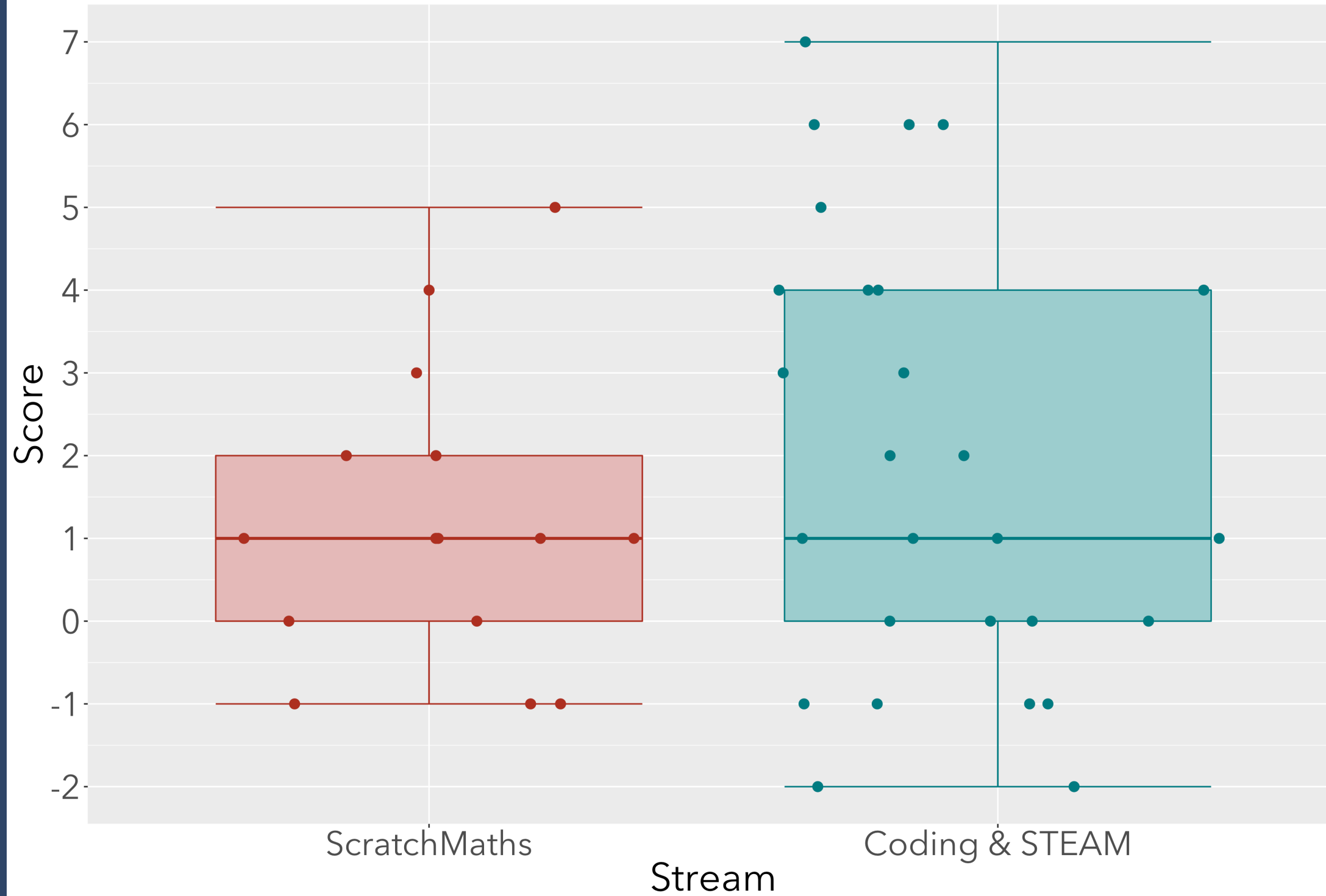Pre-test Results for Quiz: Sequences
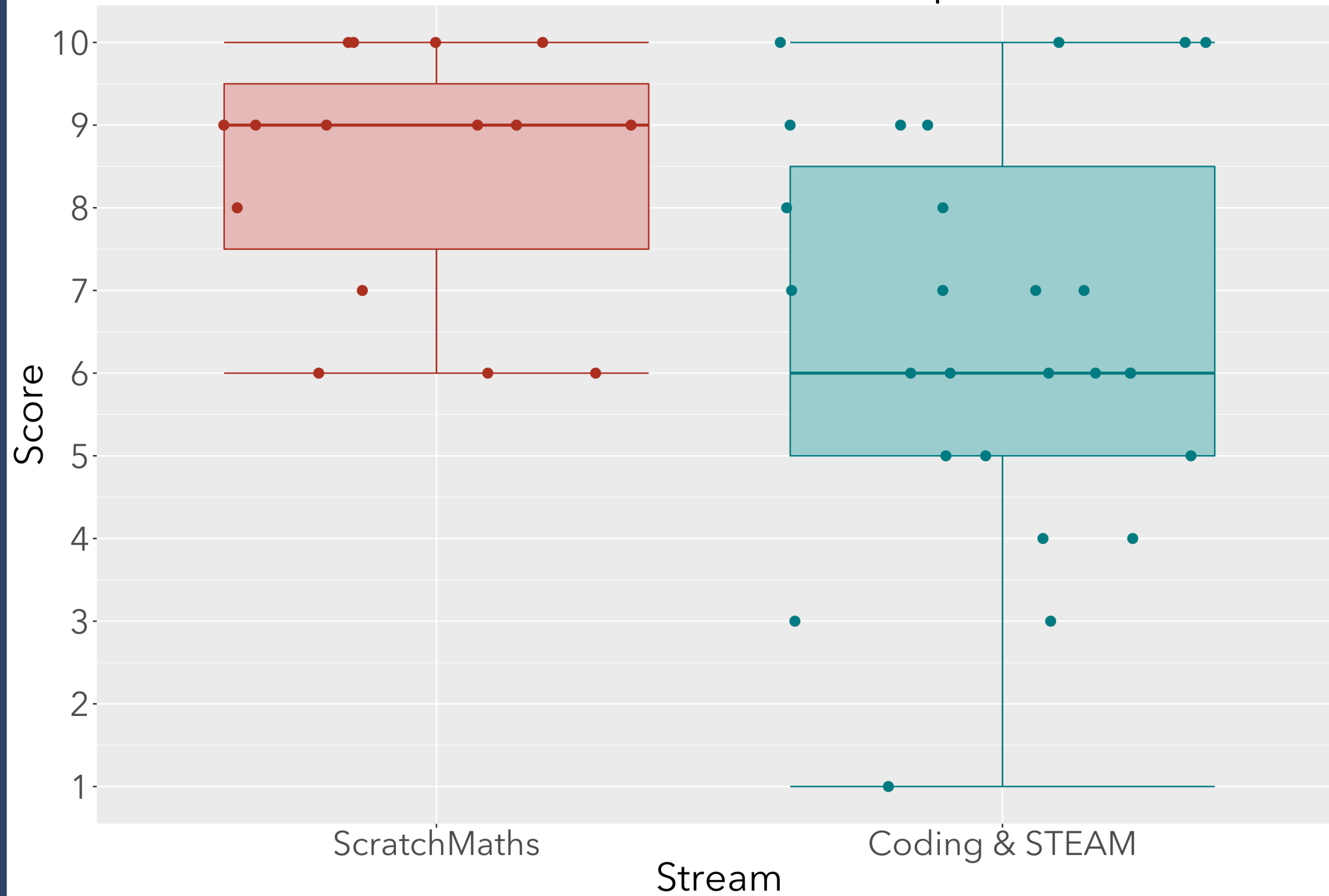
Gain in Quiz Results: Sequences

Pre-test Results for Quiz: Loops

Gain in Quiz Results: Loops

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