

## Flowing SOLO

By [Fraser Scott](#) | 24 August 2020

Researchers put their new scaffolding method for argumentation to the test

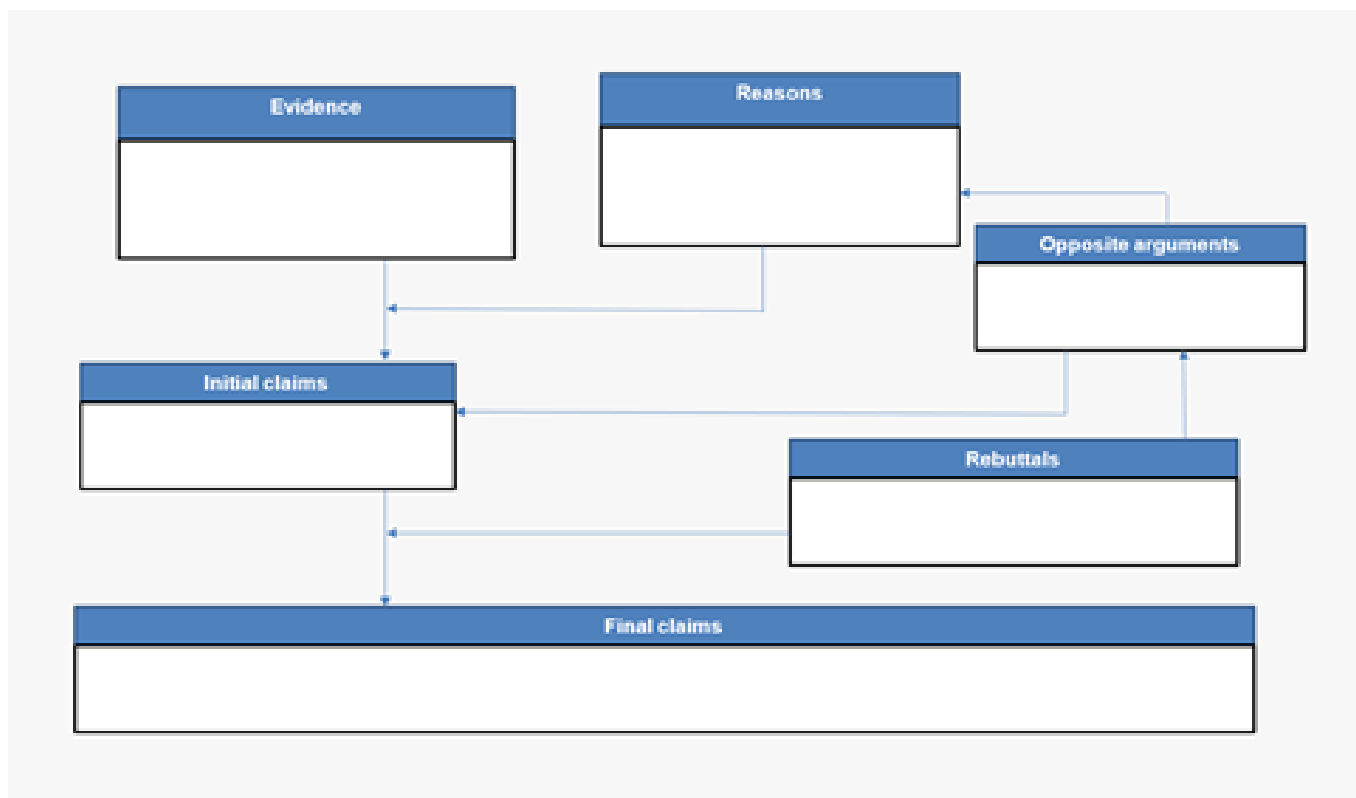


Source: © Elly Walton/Ikon Images

Scaffolding students' argumentation helped improve their ability to provide evidence and rebuttal

A recent study helped students to construct clear, logical arguments by scaffolding the argumentation process. Scientific practice involves justifying claims based on empirical or theoretical evidence, and argumentation is a key aspect of this. However, students often find justifying their claims with evidence and rebutting counterarguments difficult.

The researchers from South China Normal University, China, developed a reasoning flow scaffold (RFS) that identifies four key components of an argument: claims, evidence, reasons and rebuttals. Their RFS involves a box-and-arrow diagram, where boxes represent argument



Source: Royal Society of Chemistry

An reasoning flow scaffold worksheet with boxes and arrows following the development of an argument. Download your own template below.

components and arrows represent the logical relationships within the argument. They reasoned that making these features explicit familiarises students with the structure of a sound argument and helps them generate good arguments of their own.

The research team also explored a way to measure student performance in argumentation using the previously established structure of observed learning outcomes (SOLO) taxonomy. The [SOLO taxonomy](#) splits degrees of understanding of a concept into five levels. Each progressive level contains an increasing number and complexity of connections.

Together, the five levels of the SOLO taxonomy and the four components of argumentation in their RFS resulted in a rubric for assessing student-generated scientific arguments.

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A reasoning flow scaffold argumentation template to use with your students as [MS Word](#) or [pdf](#).

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## The flow of reason

The researchers used their new rubric to investigate whether the RFS teaching strategy promotes students' written arguments.

Two classes of 15–17 year-old students were used as a control and an experimental group. The experimental group were taught using the RFS, while the control group received a more conventional teaching approach to argumentation.

Both groups received the same teaching schedule over a 16-week period. Their schedule included a pre-test, a post-test and three written argument assignments. Each student's answers to the measurement task in the pre- and post-tests were coded based on the new rubric.

## Improving performance?

The results showed that both the conventional teaching approach and the RFS could improve student performance across all four categories of argumentation. However, RFS instruction significantly improved students' ability to provide *evidence* and *rebuttal*, compared to the more conventional teaching approach.

The RFS strategy transforms the complex process of constructing sound scientific arguments into basic elements that are logically connected. This study showed that it can help students to think about how to write their own arguments.

### Teaching tips

- Familiarise yourself with the RFS process using the [research article](#) – it provides several examples of the RFS in action.
- Try the measurement instrument used in the study in your classroom. It focuses on a particular topic that may be suitable depending on your needs. If not, you can easily use it as a template to design your own resources and assessments.
- Even if you don't want to use the RFS approach, the rubric that has been created to assess student argumentation could be helpful in assessing your preferred approach to argumentation.
- Beyond assessing the argumentation process, the analysis of students' arguments can provide a great deal of information about students' understanding of scientific content and reasoning.

## Downloads

### RFS template

Editable handout | Word, Size 93.82 kb

### RFS template

Handout | PDF, Size 42.96 kb

**DOWNLOAD ALL**

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## References

L Luo, B Wei, M Shi and X Xiao, *Chem. Educ. Res. Pract.*, 2020, DOI: 10.1039/c9rp00269c