Student engagement with problem-solving scaffolds in chemistry: Teaching associates' perspectives and practices.

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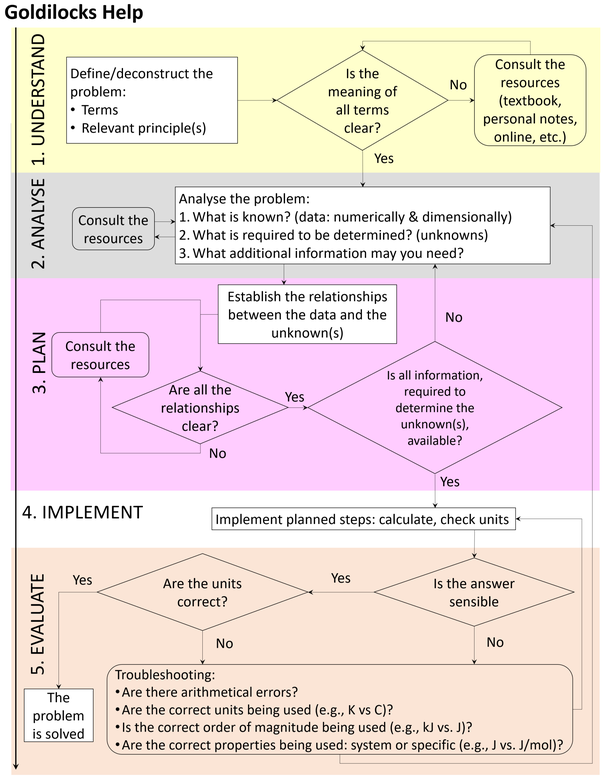
INTRODUCTION

Problem solving is a fundamental skill in chemistry. Yet students have difficulties solving problems in chemistry. These difficulties may be instructor-driven. Instructor-driven difficulties could stem from some teaching practices, such as expecting students to apply procedures without showing their reasoning or solely focusing on worked examples. Such practices could inhibit the development of problem-solving skills.

To address these challenges, our group developed a scaffold (Goldilocks Help) to support both students and instructors through structured problem solving.[1] This study explored how teaching associates (TAs) used the problem-solving scaffold and how this practice affected their teaching and perceptions of student learning.

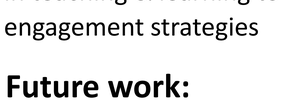
Goldilocks Help



METHOD

Data collection

Semi-structure interviews with 7 TAs



- ~ 2 years teaching experience
- PhD: current or completed

Data analysis

1. Round 1: Semester 1 — • 3 written • 3 audio
2. Analysis — Inductive[2]
3. Round 2: Semester 2 — • 1 written • 5 audio
4. Analysis — Abductive

CONCLUSION

Understanding students' interaction with the scaffolds will help to inform innovations in teaching & learning to optimise engagement strategies

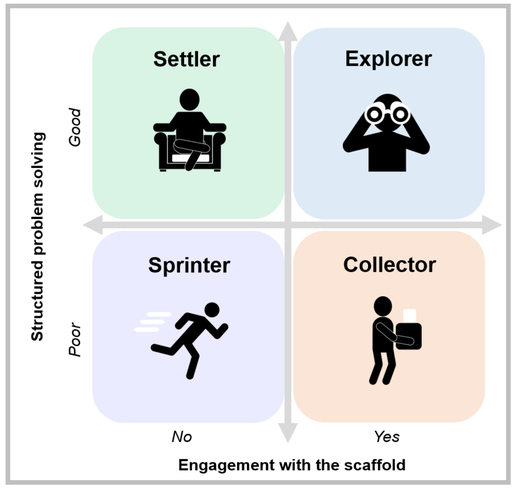
Future work:

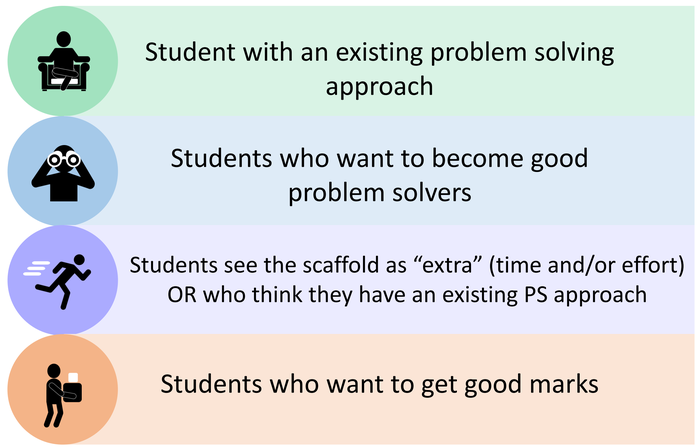
Conduct think-aloud interviews with student & instructors to:

- Test student profiles
- Expand on the findings
  e.g. trajectory of profiles
- Capture a longitudinal perspective

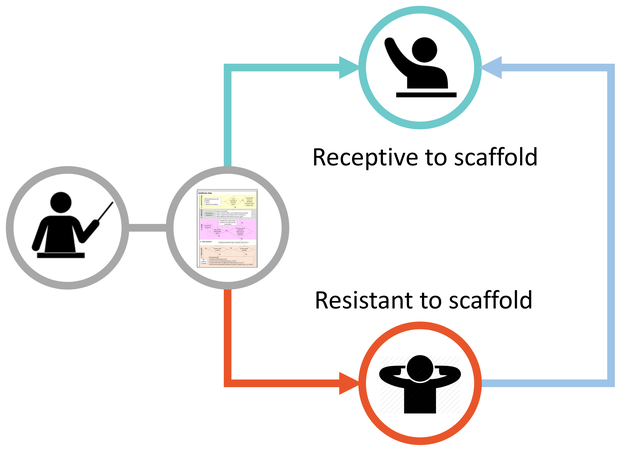
RESULTS & DISCUSSION

TAs reflected on students who were receptive and resistant to the scaffold. We were able to categorise their perspectives on student engagement with the scaffold into four distinct student profiles. Student types are positioned along two axes: student' problem-solving abilities (good or poor) and orientation towards the scaffold use (yes or no).





Teaching with the problem-solving scaffold was found to be beneficial, albeit with some student resistance. The scaffold provided a common thinking structure between the instructor and students. This enabled the TAs to easily identify mistakes and address specific areas of concern. However, some students did not engage with the scaffold. Below are some strategies TAs used to encourage scaffold use:



Strategies used & suggested by TAs

1. Constant reinforcement
2. Prompting during & prior to problem solving
3. Scaffold use during teamwork activities
4. Prolonged exposure to scaffold

Reference:

1. Yuriev, E., Naidu, S., Schembri, L., Short, J. (2017). Scaffolding the development of problem-solving skills in chemistry: guiding novice students out of dead ends and false starts. *Chemistry Education Research and Practice,* 18, 486-504
2. Ritchie, J.; Spencer, L., Qualitative data analysis for applied policy research. In *Analyzing Qualitative Data*, Bryman A & Burgess RG (eds.): London, Routledge, 1994; pp 173-194.

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