STUDENT APPROACHES TO PROBLEM SOLVING: WHAT DO STUDENTS REALLY THINK WHEN THEY SOLVE PROBLEMS?

Kimberly Vo[a], Mahbub Sarkar[b], Paul White[a], and Elizabeth Yuriev[a]

Presenting Author: Kimberly Vo (Kimberly.vo@monash.edu.au)
[a]Faculty of Pharmacy and Pharmaceutical Sciences, Monash University, Parkville VIC 3052, Australia
[b]Faculty of Medicine, Nursing and Health Sciences, Monash University, Clayton VIC 3800, Australia

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Students use multiple strategies to solve chemical problems. However, not all problem-solving approaches are conducive to successful problem solving. The effectiveness of an individual's approach depends on their content knowledge, experience, and metacognitive skills. In this research project, we explored the pathways students undertake while solving chemical problems by conducting think-aloud interviews with first-year undergraduate students. The interviews were analysed thematically and student problem-solving approaches were categorised into productive or unproductive (Rodriguez et al., 2019; Yuriev et al., 2017). Unsuccessful attempts lacked structure and relied on a trial-and-error approach. For example, these students listed all equations they could recall in an attempt to match to the data found in the problem. Successful students took a more structured and meaningful approach. For example, they identified core concepts underlying the problem in order to apply relevant knowledge. Additionally, successful students readily integrated metacognitive strategies to monitor the productivity of their approach. These techniques allowed them to identify errors and assess whether their answer sounded reasonable. An understanding of the variety of student problem-solving approaches, productive and unproductive, will help to inform instruction that addresses student misconceptions and accounts for student struggles with problem solving.

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