

CHARACTERISTICS OF PROBLEM SOLVING IN SPECTROSCOPY: PRODUCTIVE AND UNPRODUCTIVE PATHWAYS

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Solving spectroscopy problems is a complex challenge. There are many possible approaches to solving such problems however students often believe there is only a single right pathway to reach the correct endpoint. Previously, we generated teaching resources by recording solutions produced by Honours and PhD students, postdocs, senior researchers, and professors (Yuriev, 2018). This presentation will cover the novel analysis of these recordings, that was carried out to identify productive and unproductive pathways in problem solutions and to explore their novice and expert characteristics. Think-aloud interviews revealed that participants with different academic levels demonstrated common problem-solving features, for example assessing completion. However, the feature expression was expertise-dependent. For example, all participants initiated problem solution by interpreting spectral data, however novices did it less productively than the experts. Similarly, unlike novices, experts were able to explicitly verbalise their problem-solving strategies and reflect on the quality and meaning of the solution outcome. Recognising alternative problem-solving pathways highlights the diverse ways a problem can be interpreted and solved. The multiple possible strategies identified during the analysis will inform spectroscopy teaching and learning and will allow students to develop their own strategies to solving spectroscopy problems.

REFERENCE

Yuriev, E., Burton, J., Vo, K., Maher, S., Thompson, C., & Scanlon, M. (2018). Engaging students with multiple pathways for problem solving. *Proceedings of the Australian Conference on Science and Mathematics Education* (pp. 104-105). Flinders University, Adelaide, Australia.

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