The development of undergraduate science students' scientific argument skills in oral presentations

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The Science Threshold Learning Outcomes (TLOs) developed recently as part of the Learning and Teaching Academic Standards project, reinforce that the ability to develop evidence-based, well-reasoned arguments and to clearly communicate those arguments in a variety of communication modes, are key graduate attributes (Jones *et al*., 2011). However, in practice, specific measurement of these skills is limited, particularly in oral presentations. This study describes the initial literature-based development of a rubric for the evaluation of scientific argument in oral presentations (Toulmin, 1958; Sampson *et al*., 2009), and the reiterative, data-driven process of refinement of that rubric. The rubric reflects the established framework for the scientific argument, by including criteria for claim, evidence and reasoning, and evaluates these three components across standards that represent the variation within a mid-level undergraduate cohort.

Using this rubric, we evaluated the ability of undergraduate science students to communicate scientific arguments in an oral presentation task in which they presented data acquired from an inquiry-based practical (Bugarcic *et al.*, 2012). Students demonstrated the ability to make claims, supply evidence and articulate reasoning that linked claims with supporting evidence. The rubric revealed a clear increase in quality of arguments in oral presentation, specifically in claim and reasoning elements as a result of the teaching intervention. Furthermore, the intervention helped students to more clearly articulate what constitutes a good argument and the relationship between the argument elements. In summary, this study reports on the development of the rubric and describes the design and impact of an evidence-driven teaching intervention that enhances students' scientific argument development in oral presentations.

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