Empowering the crowd: faculty discourse strategies for facilitating student reasoning in large lecture

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Oregon State University (OSU) has restructured its introductory calculus-based sequence including reformed curriculum modeled after the Interactive Science Learning Environment (ISLE). ISLE is driven by an experimental cycle roughly summarized as: observe phenomena, find patterns and devise explanations, test explanations, develop a model, apply the model to new observations. In implementing ISLE at OSU we have chosen to focus on student scientific reasoning, specifically student ability to develop and test models, make explicit judgments on how to approach open-ended tasks, and take an authoritative role in knowledge development. In order to achieve these goals, the lecture course heavily utilizes social engagement. During large-lecture group work, emphasis is placed on facilitating student discourse about issues such as what systems to choose or how to define an open-ended problem. Instructional strategies are aimed at building off the group discourse to create a full-class community where knowledge is developed through collaboration with peers. We are achieving these goals along with an increase in measured student conceptual knowledge and traditional problem solving abilities, and no loss of content coverage. It is an ongoing effort to understand "best" instructional strategies and to facilitate new faculty when they teach the curriculum. Our research has focused on understanding how to facilitate activities that promote this form of discourse. We have quantitative analysis of engagement based on video data, qualitative analysis of dialogue from audio data, classroom observations by an external researcher, and survey data. In this session we share a subset of what we have learned about how to engage students in scientific reasoning discourse during large lecture, both at the group-work and full-class level.