

# Managing Natural and Effective Tutorial Interactions

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In the spoken dialogue system community, there is mounting evidence that mixed-initiative systems lead to improved user satisfaction and performance. In the intelligent tutoring system community, research suggests that "Socratic" dialogues, which encourage students to do as much of the work as possible, lead to increased learning gains. In this talk, we investigate the relationship between Socratic dialogue and initiative. We present an empirical study replicating prior research findings which indicate that Socratic interactions correlate with better learning outcomes. We then present the results of a linguistic analysis that compares level of student initiative in Socratic dialogues to user initiative in task-oriented and advisory dialogues, two genres that are prevalent in spoken dialogue systems. We also identify common Socratic dialogue strategies, such as co-constructing explanations and leading students through lines of reasoning. These strategies unfold over multiple turns and require a dialogue system to be flexible enough to deal with unexpected responses, interruptions, and failure of tactics. To provide these capabilities, we have developed a dialogue management framework, inspired by the three-level architectures used in robotics. The integration of a deliberative planner with a dialogue move engine allows the interleaving of planning, execution, and monitoring.