

Interactive Event: The Rimac Tutor - A Simulation of the Highly Interactive Nature of Human Tutorial Dialogue

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Rimac is a natural-language intelligent tutoring system that engages students in dialogues that address physics concepts and principles, after they have solved quantitative physics problems. Much research has been devoted to identifying features of tutorial dialogue that can explain its effectiveness (e.g., [1]), so that these features can be simulated in natural-language tutoring systems. One hypothesis is that the highly interactive nature of tutoring itself promotes learning. Several studies indicate that our understanding of interactivity needs refinement because it cannot be defined simply by the amount of interaction nor the granularity of the interaction but must also take into consideration how well the interaction is carried out (e.g., [2]).

This need for refinement suggests that we should more closely examine the linguistic mechanisms evident in tutorial dialogue. Towards this end, we first identified which of a subset of co-constructed discourse relations correlate with learning and operationalized our findings with a set of nine decision rules which we implemented in Rimac [3]. To test for causality, we are conducting pilot tests that compare learning outcomes for two versions of Rimac: an experimental version that deliberately executes the nine decision rules within a Knowledge Construction Dialogue (KCD) framework, and a control KCD system that does not intentionally execute these rules.

In this interactive demo, participants will experience the two versions of the system that students have been using in high school classrooms during pilot testing. Students first take a pre-test, and then complete a homework assignment in which they solve four quantitative physics problems. In a subsequent class, they then use the Rimac system and finally during the next class meeting take a post-test. When working with the Rimac system, students are asked to first view a brief video that describes how to solve a homework problem and then are engaged in a reflective dialogue about that problem. See [4] for a more detailed description of the pilot study and planned analyses.

Demo participants will have the opportunity to experience exactly what the students experience when working with Rimac. They will see the video and engage in a reflective dialogue about that problem with the highly interactive

version of the system. But in addition, as they progress through the interactive dialogue, the control dialogue will play along beside the interactive one in order to highlight the differences and illustrate when one of the nine rules that comprise the interactive version of the system has been applied.

Rimac was built using the TuTalk tutorial dialogue toolkit [5] but has been enhanced with additional dialogue features such as reformulation of student input (e.g., [6]). The dialogues are tutor-initiative only and are primarily short answer questions in order to keep the accuracy of automatic recognition high. The system does request student explanations at a few key points in the dialogues but does not attempt automatic recognition of student responses to these particular questions. Instead it always follows-up with multiple choice answers for the explanation question and a request that the student select the best match for the explanation he/she just provided. Demo participants will also see Rimac's method for handling explanation questions.

A web-viewable Interactive Event Presentation is available at <https://sites.google.com/site/rimacdemo>. Please note that it is best viewed using non-mobile devices. If you choose to use a mobile device, you will be instructed to download the Educreations app to view the worked example video.

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