

Agentic Engagement with a Programmable Dialog System

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ABSTRACT

Dialog with a social pedagogical robot or agent is a powerful way for kids to learn [1, 5] but may limit the formation of an *agentic relationship with the technology* [9]. One main purpose of conversational agents is to allow the user to have a natural interaction that reduces the need to learn artificial conventions [6], but dialog systems fall short with respect to failure recovery, vocabulary diversity, remembering conversational history, and other measures [2, 3]. Further, Hill et. al. [4] found that people adapt their model of communication to match a chatbot's in the same way they do with a child or non-native speaker. Thus, users conversing with a pedagogical agent are implicitly trained to shape their behavior to suit the technology rather than shaping the technology. For young learners, particularly among populations that have been historically excluded from technology fields, this limits agency and reinforces marginalizing power structures [9].

This project combines a conversational agent with ideas of *agentic engagement* to help middle-school-aged children learn computational thinking. Agentic engagement is defined as students' constructive contribution into the flow of instruction and includes behaviors such as expressing interests, preferences, and opinions. It has been positively correlated to learning performance and motivation [7, 8]. Combined with a culturally responsive curriculum (CRC), agentic engagement may help to foster an agentic relationship with technology. Our system encourages learners to engage agentially by using programming constructs to change the agent's *vocabulary*, recognizing the intent behind a user utterance (an *invocation*), and defining the *action* the agent will take to respond to an invocation. Students use computational thinking concepts such as pattern recognition, abstraction, and decomposition to convert ideas into commands for the dialog system and to understand

which of their ideas can't be programmed with the technology as presented. They learn both to personalize the system today and to see the agent as a technosocial construct that they can shape in the future.

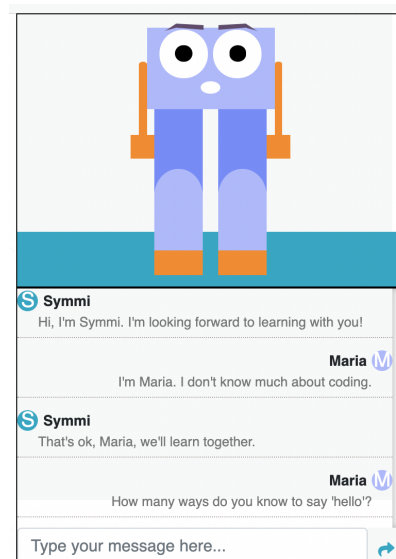


Figure 1: A screen shot showing the robot character and with its chat box below

Programming can be accomplished either using Google's Blockly visual programming tool (<https://developers.google.com/blockly>) or through conversation with the agent itself. The agent is embodied as a robot character, so agent actions can be verbal, physical, or both. Through social dialog with the agent, learners reflect on how computational thinking is relevant to themselves and their communities as part of a CRC, building on the work of Stewart et. al. [10]. For example, learners may be asked to reflect on the relationship between greeting behaviors and identity. After designing a greeting interaction, learners program the dialog system to achieve the greeting. Then learners may be asked to imagine how

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they might hypothetically enhance the dialog system to make it even more capable of implementing their preferences.

In parallel to the development of the dialog system and curriculum, we will also adapt Reeve’s agentic engagement instrument [7] for CRC. Our contributions will include this instrument, insights into the relationship between agentic engagement and an agentic relationship with technology, and insights into how a programmable dialog system impacts agentic engagement and learning computational thinking.

CCS CONCEPTS

• **Human-centered computing** → **HCI theory, concepts and models**; • **Social and professional topics** → **Computational thinking**.

KEYWORDS

agency, agentic engagement, dialog systems, culturally responsive curriculum

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