Supporting Upper Elementary Students in Multidisciplinary Block-Based Narrative Programming

Jessica Vandenberg
Anisha Gupta
Andy Smith
jvanden2@ncsu.edu
agupta44@ncsu.edu
pmsmith4@ncsu.edu
North Carolina State University
USA

Rasha ElSayed
Kimkinyona Fox
Aleata Hubbard Cheuoua
relsaye@wested.org
kfox@wested.org
ahubbar@wested.org
WestEd
USA

James Minogue
Kevin Oliver
jminogu@ncsu.edu
kmoliver@ncsu.edu
North Carolina State University
USA

Cathy Ringstaff
cringst@wested.org
WestEd
USA

Bradford Mott
bwmott@ncsu.edu
North Carolina State University
USA

ABSTRACT

Digital storytelling, which combines traditional storytelling with digital tools, has seen growing popularity as a means of creating motivating problem-solving activities in K-12 education. Though an attractive potential solution to integrating language arts skills across topic areas such as computational thinking and science, better understanding of how to structure and support these activities is needed to increase adoption by teachers. Building on prior research on block-based programming for interactive storytelling, we present initial results from a study of 28 narrative programs created by upper elementary students that were collected in both classroom and extracurricular contexts. The narrative programs are evaluated across multiple dimensions to better understand the types of narrative programs being created by the students, characteristics of the students who created the narratives, and what types of support could most benefit the students in their narrative program construction. In addition to analyzing the student-created narrative programs, we also provide recommendations for promising system-generated and instructor-led supports.

1 OVERVIEW

Digital storytelling has received growing recognition as an effective tool for enabling learning in the classroom [3], including in science classes [4]. Meanwhile, there is growing emphasis on computational thinking (CT) learning at the elementary level, a topic for which elementary teachers tend to have minimal training [1]. Moreover, teachers facing dwindling instructional time may view storytelling as an inefficient form of teaching [5]. In this poster, we present InfuseCS, a narrative-centered learning environment that integrates science, CT, and storytelling in support of meaningful learning. Building on findings that storytelling motivates students to learn programming [2] as well as best practices for designing block-based programming languages for younger learners [6], we conducted a series of pilot studies with students in the southeastern and western United States. We assessed the block-based narrative programs students created in the pilots on CT, story quality, and science concepts using a multi-dimensional rubric. Three profiles of student performance and understanding emerged—from incomplete science and minimal block and CT concepts usage to near mastery of these concepts. As a result of these findings, we suggest varied system and in-class supports including checklists that students can use to identify which criteria they have completed, to more complex AI-driven systems utilizing natural language processing to understand student stories.

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