Chapter 8
Steamsational Writing:
An Investigation Into Using Robots to Inspire Children's Narrative Skills

Marybeth Green
Texas A&M University, Kingsville, USA

C. Lisa McNair
iD https://orcid.org/0000-0002-8078-3150
Texas A&M University, Kingsville, USA

ABSTRACT

Providing young children with rich environments for writing has been a continuing quest for teachers in the early grades. This chapter investigates the use of Bee-bot robots as a means of creating a stimulating environment that engages second graders in the writing process and learning story grammar elements. Researchers met with the students weekly for an hour over six weeks. In the first week, students wrote an initial story and learned the basics of programming a Bee-bot robot. In subsequent weeks, students listened to a story set in the context of the Bee-bot mat, reviewed vocabulary words, planned a path for their robot, wrote a short story, and executed their robot program. There was a significant difference overall between the baseline story and the final story, and between the initial rating of each of the story grammar elements and the final rating of the elements, with the exception of Character.

INTRODUCTION

The term STEM, an acronym for Science Technology, Engineering and Math, has become a part of the lexicon now. It reflects the continuing efforts on the part of legislators, educators and policy makers to "increase advanced training and careers in STEM fields, to expand the STEM-capable workforce and to increase scientific literacy among the general public" (National Research Council, 2011, p 4.). While some trace the intense focus on STEM to the Sputnik era, many attribute the increased focus in the early 2000s on poor performances by American students on international exams such as PISA and the declining enrollments in STEM related fields in higher education. This spurred efforts to increase

student interest in STEM at all levels of education and to increase teacher proficiency and capacity to deliver STEM content. It was argued that without this intense effort that American productivity and innovation in the future would wane.

Regrettably, the intense focus on the STEM fields led to a decline in the Arts. STEM was perceived as "objective, logical, analytical, reproducible, and useful" while the arts were considered "subjective, intuitive, sensual, unique and frivolous" (Sousa & Pilecki, 2018). Throughout the early 2000s, many Arts programs were reduced or eliminated as schools faced difficult budget decisions and time allocations. Aróstegui (2016) argues that STEM content became privileged as it was associated with economic prosperity leading to the detriment of other content areas.

In time, however, educators began to see the benefits from integrating the Arts into the STEM content areas. In 2011, the acronym STEAM first appeared in Education Week in an article making the case for adding the arts to the STEM content areas (Robelen, 2011). It was argued that progress in STEM did not come from STEM alone, but from the fusing of STEM and creativity (Land, 2013). Controlled studies of large groups of STEM professionals found correlations between arts, musical, literary, or crafts activities and STEM success as indicated by Nobel prizes, patents or companies founded (Root-Bernstein, 2015). It has also been asserted that the STEM content areas and the arts shared many common thought processes including inspiring curiosity, making accurate observations, viewing an object in a different form, constructing meaning and expressing oneself accurately, thinking spatially, and perceiving kinesthetically. Integrating the arts into the STEM content areas enables multisensory hands-on lessons and makes learning more personal for students (Maslyk, 2016). Finally, STEAM programs promote interdisciplinary learning experiences rather than the traditional silo instructional designs where learners study content in isolation (Shin, 2017).

Educational robotics has a natural place within the STEAM curriculum. Many see educational robotics as a tool for teaching processes in building, programming and manipulating robots (Zawieska & Duffy, 2015). However, their interdisciplinary nature enables them to nimbly adapt to facilitating learning about content throughout the curriculum (Eguchi, 2012, Eteokleous-Grigoriou, & Psomas, 2013). While robots have frequently been used to teach Science concepts, many researchers and educators are exploring their place in the Arts curriculum. Working with robotics involves innovative problem solving and creative thinking, processes which are closely aligned with the arts (Sousa & Pilecki, 2018, Zawieska & Duffy, 2015). Students have taught robots to dance (Sullivan & Bers, 2017), to create music (Martinez, Gomez, & Benotti, 2015), and to draw (Nagel, 2018, Sullivan, Strawhacker, & Bers, 2017). The main focus for these studies, however, was on using the arts as a context for developing either coding or computer science skills as measured by a variety of assessments. A common theme throughout these studies was the observation that students found using the robots a fun, engaging experience. As Bers, Flannery, Kazakoff, and Sullivan (2014) assert, "robotics can provide a fun and playful way for teachers to integrate academic content with the creation of meaningful projects" (p. 145).

Using robots to inspire and energize students' creative writing, however, is an emerging field of research where little has been done. The purpose of this research project was to investigate how robots could be used in a primary school classroom to inspire students' writing and knowledge of story grammar elements.

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