Chapter 5
Using Technology to Make Science More Accessible for Students With Disabilities

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ABSTRACT

To successfully participate in the science learning experience, students are expected to participate in investigations and communicate their thinking with their peers. However, in order to engage in these conversations and develop a deeper understanding of the science concepts being explored, it is necessary to understand the specialized vocabulary being used. Science teachers do not regularly provide evidence-based vocabulary instruction in the classroom which could create difficulty for students with disabilities who often know a smaller number of vocabulary word meanings and have executive functioning difficulties. In this chapter, a technology-based instructional approach to support the science vocabulary learning among students with disabilities will be introduced and discussed. In addition, production steps for the technology will be provided.

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INTRODUCTION

Pandemic, contagious, fracking, toxins, climate: terms such as these are currently used regularly by media and in political and informal conversation. Science provides individuals with the knowledge and skills necessary to understand contemporary issues, determine why these issues are important, and identify ways in which they can contribute to their solutions (National Research Council (NRC), 2012). However, to learn science requires one to have the ability to effectively communicate in, reason with, and decipher the language of science (Lemke, 1990; Pearson et al., 2010; Reeves, 2005). Lacking an understanding of scientific language acts as a barrier to students being successful in learning or communicating science concepts (Wellington & Osborne, 2001).

Many individuals do not have the necessary science knowledge to engage in conversations about issues and policies or make informed decisions (e.g., making a medical decision, or determining the best place to build a home) (NRC, 2012). This lack of knowledge often begins early and has ultimately led to a significant underperformance on science achievement tests nationally (Morgan et al., 2016; National Assessment of Education Progress (NAEP), 2018). This is especially true for students with disabilities. For example, 66% of eighth-grade students with disabilities scored below-basic on a national science achievement test compared to 28% of their general education peers (NAEP, 2018). This gap in science achievement on the NAEP is also present between fourth-grade students with disabilities and their peers (47% versus 21% earned a score that was "below basic" respectively) as well as among twelfth-grade students with and without disabilities (71% earning "below basic" compared to 36% respectively). To reduce the science achievement gap between students with disabilities and their peers, the use of assistive technology has been explored and developed (Reed et al., 2019; Xin & Rieth, 2001). The purpose of this chapter is to introduce and discuss a technology-based approach for instruction in science courses for students with disabilities.

THE LANGUAGE OF SCIENCE: VOCABULARY AS A BARRIER FOR SUCCESS

In the science classroom, students are expected to participate in investigations that require them to not only engage in and learn through conversations with their peers concerning questions, findings, and conclusions, but also have the necessary background information to participate effectively (Windschitl et al., 2018). To engage fully in conversations and develop comprehension of the underlying concepts taught in science, it is necessary to have familiarity and understanding of the terminology