Chapter 3
Accessing STEM Education Through Assistive Technology

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ABSTRACT

The chapter gives an overview of a model of STEM that is being utilized in pre-service teacher preparation. This model draws on educational research in learning theory and inquiry-based learning and teaching and works to frame the criteria for quality STEM learning experiences. Understanding the vision for STEM education will illuminate the issues and possible strategies for using assistive technology in inclusive STEM classrooms. The chapter also provides examples of implementing various assistive technologies—no/low-tech devices, mid-tech devices, and high-tech devices—and examples of mixed and extended reality technologies that could be used in inclusive STEM education.

CHAPTER OVERVIEW

This chapter explores a model for STEM (science, technology, engineering, and mathematics) education which provides students in inclusive classrooms (those with *and* without special needs) opportunities to engage in their learning in a meaningful, relevant way. The model articulates best practices for learning, such as connecting learning experiences to real-world problems, as well as engaging

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students in communication, collaboration, and critical thinking. The results for all learners are deeper and retained learning and access to quality STEM instruction. Educators can use this lens when planning instruction, facilitating their lessons, making adaptations, differentiating instruction for students with special needs, and choosing assistive technologies to support learners.

THE INTERSECTION OF STEM AND SPECIAL EDUCATION

Ways to make STEM (science, technology, engineering, and mathematics) education inclusive have been gaining attention in educational research (Elsey, 2019; Guzman-Orth et al., 2021). The research suggests that with rich STEM learning experiences, students develop a strong foundation in problem-solving, critical thinking, and soft skills (Allen et al., 2019; Bransford et al., 2000; Bush & Cook, 2019; Bybee, 2012; Guzman-Orth et al., 2021; Vasquez et al., 2013). Learning experiences for all learners in STEM and other disciplines should include:

1) Engaging students in relevant learning experiences (Bender, 2012; Cook & Bush, 2019; Larmer et al., 2015; National Research Council, 2012) by utilizing tools that spark creativity—not just as a user, but also as a creator and developer of technology (Davis et al., 2019; Guzman-Orth et al., 2021)
2) Activating students' social-emotional learning as a vehicle for collaboration, perseverance, and empathy when assessing and engaging in problem-solving (Allen et al., 2019; Bush & Cook, 2019)
3) Recognizing equity for all diverse learners and creating situations for those students to be engaged and successful (Bransford et al., 2000; Bush & Cook, 2019; Guzman-Orth et al., 2021, National Research Council, 2013)

As educators, we are responsible for giving students the resources they need to be active and successful in their learning. Throughout the chapter, Drs. Chesney and Wilson, assistant professors in the Education Division at the University of Pittsburgh at Johnstown, discuss the benefits of inclusive STEM education and provide examples of tools that can be incorporated into lessons so that students with special needs can also meaningfully engage in STEM activities. The authors highlight the importance of utilizing assistive technology (AT) to provide students with special needs access to equitable STEM education.

With AT being a relatively new discipline, there have been questions about utilizing AT among general educators, special educators, related service professionals, and families regarding what AT is and how AT can assist in bridging the achievement gap. AT is one of the tools that Individualized Education Program (IEP) team members