

Science Learning with *Hero Elementary*: Blended Learning Resources to Reach English Learners Students

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Approximately 5 million, or about 10 percent, of public-school students in the U.S. are English learners. As the Next Generation Science Standards (NGSS) become more widely adopted, the need for NGSS-aligned learning resources for English learners is particularly acute. To address the needs of English learners, designers of digital and blended science learning resources are incorporating features into their products that support equitable access to instructional content, including providing flexibility for educators to adapt resources for students to better access the learning content. This case study examines the design features of *Hero Elementary* and their use with English learners. The study provides examples of design strategies useful in creating learning resources, and evidence of how professional development focused on equity and accessibility provide access to and engage English learners in science.

Hero Elementary, produced by Twin Cities PBS (TPT), is a multiplatform educational media initiative that includes a suite of digital and non-digital learning resources designed to support science and literacy learning for children in grades K–2. The engaging *Hero Elementary* narrative involves a school for young superheroes, where kids learn to master their superpowers—like flying and teleportation—while exploring science. The diverse group of characters includes Lucita Sky, AJ Gadgets, Sara Snap and Benny Bubbles, along with their enthusiastic teacher, Mr. Sparks (Figure 1). The characters use their “Superpowers of Science,” based on the NGSS Science and Engineering Practices, to help them investigate, observe, make predictions, and find solutions to problems they encounter.

Educators implementing *Hero Elementary* participate in professional development and have access to resources through an educator website. They learn how the resources are designed and can be adapted to provide greater access to science content for their English learners and other student groups underrepresented in STEM, including students with disabilities and those identified as socioeconomically disadvantaged.



Figure 1. *Hero Elementary*'s cast of characters.

Designing and Using Resources with Access in Mind

Early in the development process, TPT's resource design team conducted an extensive review of research to identify best practices for designing science learning resources for English learners. The team then created design specifications for the development of *Hero Elementary* learning resources to guide content creators to use an asset-based approach to support English learners and other student groups that are historically underrepresented in STEM. This led to the production of learning resources and educator training intended to provide support for English learners' access to science and literacy content, including resources and practices that present content in multiple representations, provide opportunities for hands-on exploration, include discussion and reflection about science, use discourse practices, provide language and literacy support, and connect academic content to home culture.

The Case Study

Hero Elementary resources are specifically designed to support English learners, allowing them to engage meaningfully with science and literacy content. The case study addressed two aspects of the resources: design and use. The study's guiding questions related to English learners include:

1. Do the design features of *Hero Elementary* support access to science learning for K–2 English learners?
2. What adaptations do educators make to *Hero Elementary* resources to provide greater access to the content for their English learners?

The descriptive case study was conducted in four large afterschool programs serving a range of student populations that have been historically underrepresented in STEM. Twenty-five administrators and educators participated in the study. Data collection included administrator and educator interviews, written communication with educators, and observations of educator planning meetings. Qualitative analytic methods were used to analyze the data. The analyses included data reduction and peer debriefing.

Findings

Data analysis produced findings related to the case study's guiding questions focused on English learners' experiences using *Hero Elementary* in their afterschool programs. All educators reported that their English learners were able to successfully access and engage with all aspects of *Hero Elementary* content. The findings detailed below describe how *Hero Elementary*'s design features and educators' adaptations facilitated English learners' engagement in science and literacy learning.

Providing Language and Literacy Support

Educators described how *Hero Elementary* features and classroom practice supported their English learner students in building both English and literacy skills, including that:

- using the videos and e-Readers was particularly helpful to build literacy and language acquisition;
- incorporating new vocabulary from *Hero Elementary* into direct instruction reinforced literacy learning and science concepts in English; and
- having students work closely with bilingual peers who translated for them, and students supporting and encouraging each other to master activities and move through the engaging activities, strengthened engagement and learning.

“One student had [a] very difficult time learning English, and watching the videos and reading the book, it helped her a lot. She was able to speak a little better, was able to recognize letters.”

“So I like how they share their own experiences. Every time someone is struggling with something, other kids enjoy helping them. So, they're helping each other while they're working. They encourage each other, as well.”

Flexible Learning Environment and Experiences

Educators appreciated the flexibility allowed by the program for students to choose activities that they found most engaging. For example, some students' learning styles and capacities lent themselves more to engaging with the hands-on activities and games, rather than the more literacy-heavy activities, while encountering and learning similar academic content in each.

Including Discussion and Reflection

According to educators, a central part of implementing *Hero Elementary* with English learners was leading

groups of students in discussion and reflection about what they were learning and how it applied to their lives. These discussions accomplished dual goals of encouraging English learners to dialogue in English and practice new vocabulary learned through the program, and also to reinforce inquiry concepts and connect learning with lived experience. This was largely done through:

- asking students targeted questions—asking students how they thought *Hero Elementary* characters felt and why they took particular actions;
- allowing students to share their ideas and opinions—asking if they had ever had similar feelings and experiences, or how the themes applied to activities happening in the afterschool program and in students' home lives; and
- giving students relaxed and fun opportunities to reflect and make connections while participating in discussions in their second language.

“We like to talk about how it's related to us. We always try to connect it with our own perspective and our own experiences so they can fully understand what they're talking about.”

Science Connected to Sense of Place/Home Culture Connections

Relatedly, educators shared that they also prompted discussion and reflection with their English learner students to connect *Hero Elementary* activities to children's familiar local contexts and places. These discussions and experiences allowed students to practice and reinforce new English and science vocabulary and to connect science to their everyday lives.

We took the vocabulary that they were learning in Hero Elementary and then, during the lesson plan, trying to relate it and connect it so it was very clear to them.

It's a very accessible program, where you can connect it to a lesson plan and what you are doing in class and what they are doing in their daily life.

Real World/Hands-On Experiences

Educators reported employing hands-on activities to help English learners engage more fully with the content and to reinforce both English and science literacy abilities. This included:

- introducing whole-group activities, such as bringing objects from home with relevance to *Hero Elementary* themes for students to interact with hands-on as part of lessons;
- implementing science investigations with students, tied to *Hero Elementary* themes; and
- helping students make connections between their recreational play and the science concepts and vocabulary they were learning through *Hero Elementary*.

“When we're outside doing our outdoor activities, when we're playing with the ball, when we're with their bicycles, they relate that with Hero Elementary: ‘Okay, we did that pushing and pulling motion.’”

Greater Access to Science Content

While educators emphasized that their priority was for English learner students to learn English, they reported providing accommodations to ensure students could successfully engage with the content including:

- translating instructions and words or phrases for English learners who asked for help or seemed confused;
- explaining what was happening in videos to make sure that students were understanding the content;
- focusing more on helping students to understand meaning rather than directly translating;
- using flexible grouping arrangements, such as pairing English learners with bilingual peers, providing one-on-one support, and facilitating whole group learning and discussion; and
- intentionally keeping accommodations to a minimum to facilitate English learning.

“What I like to do is show them a picture or something, or maybe in the program, show how that word

applies, so they can connect it with the word, 'Oh, it was that thing.'"

Conclusion

The current case study examined the equity and accessibility design features of *Hero Elementary* science learning resources and the resources' use with English learners. The study provides examples of design strategies that can guide resource designers and educators as they seek to create and use learning resources that can engage English learners in science and literacy. In addition, the study provides evidence of how educator professional development focused on equity and accessibility prompted educators to use research-based practices to provide further access to the learning content with their English learner students.

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