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Emily Hayden

Iowa State University, haydenemily4@gmail.com

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21st-century skills and science inquiry: Using self-directed inquiry to spark interest and promote research skills.

Abstract

Any online search for "21st-century skills" produces a wealth of graphics, lists, and tips. The internet is a treasure trove of literacy activities that build upon these skills, including the abilities to read, write, synthesize information, make critical judgments, and present learning. But what about students who do not engage eagerly in reading and writing, resisting because of lack of skills, confidence, or interest? Kindling a spark of interest can be difficult, and the last thing we want to do is extinguish it.

Disciplines

Early Childhood Education | Educational Assessment, Evaluation, and Research | Educational Methods | Elementary Education | Language and Literacy Education

Comments

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21ST-CENTURY SKILLS AND **SCIENCE** **INQUIRY**

Using self-directed inquiry to spark interest and promote research skills

By **Emily Hayden**

*a*ny online search for “21st-century skills” produces a wealth of graphics, lists, and tips. The internet is a treasure trove of literacy activities that build upon these skills, including the abilities to read, write, synthesize information, make critical judgments, and present learning.

But what about students who do not engage eagerly in reading and writing, resisting because of lack of skills, confidence, or interest? Kindling a spark of interest can be difficult, and the last thing we want to do is extinguish it.



Emily Hayden (ehayden@iastate.edu), an ILA member since 2018, taught in K–12 public schools for 17 years as a classroom teacher and reading specialist before moving into higher education. She teaches reading and language arts methods classes in the School of Education at Iowa State University.

The good news is that the broad scope of 21st-century skills can help educators in formal and informal settings reach all students, precisely because the skills relate to more than classroom learning. In fact, 21st-century skills are used across the life span and can be leveraged to build literacy and develop interdisciplinary knowledge for even the most reluctant readers and writers.

In particular, I have found valuable connections and learning opportunities that combine inquiry, science, and literacy.

Self-directed inquiry

Self-directed inquiry is a perfect route to building literacy and 21st-century skills. By finding and exploring personal interests, students build the life and career skills of initiative and self-direction. By developing real and compelling questions about their interests, students develop critical thinking and problem-solving skills.

When we guide students to research their interests, we enhance engagement and build skills to access and evaluate information. All of this can be done through interdisciplinary themes, integrating cross-disciplinary practices. For example, environmental literacy can be an area of interest and inquiry, even for city dwellers. Greenspaces and backyards are places to explore the natural world of animals, insects, and spiders. What do you notice when you look around? What catches your eye?

A recent personal experience inspired my thinking. I moved to a new home next to a protected greenspace. I am in the center of the city, minutes from the freeway, but outside my window, there is a jungle—an oasis for plants and animals. One chilly morning, I looked out and suddenly understood why a fox had been napping nearby the last few weeks—he was a father. A young fox toddled from the dilapidated shed next door.

Having lived most of my life in midwestern U.S. cities, I had encountered raccoons, opossums, squirrels, rats, and mice. I knew nothing about foxes, and had never had an opportunity to observe their family life. Over the next few weeks, I watched the babies grow and the parents share responsibility for their care.

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This set me on an inquiry mission. I had many questions: How many babies do foxes have? How long do babies stay with parents? Do adult foxes live as families or alone? And what *does* the fox say? I shared pictures with my own children, away at college, and they also had questions. (Will the cat be safe outside?)

Classroom connections

Later, as I prepared to work with pre-K–12 educators and extension specialists in summer professional development, I thought about the difficulties educators sometimes have inspiring students to complete research writing—an essential genre for standards-based writing instruction. I remembered how my personal fascination with the fox family had led naturally to questions, and how motivated I was to find the answers to my questions. The same could happen for students.

These animal encounters, viewed through my window, provided seeds for inquiry. My initial question explorations were via easy online searches, but conflicting information there led me to seek out more reliable sources at the library. My interest sparked initiative and self-directed inquiry. I developed real and compelling questions. I searched for answers, enhancing engagement through research and accessing and evaluating information. My inquiry was interdisciplinary, encompassing topics and tools from both literacy and science.

Inquiry projects provide unique opportunities to intersect science and literacy. Notably, P. David Pearson, Elizabeth Moje, and Cynthia Greenleaf described the synergy between science inquiry and comprehension development in “Literacy and Science: Each in the Service of the Other,” a 2010 article in *Science*. Activating prior knowledge takes the form of observation

notes and anticipatory charts in science. Scientists set purposes for reading through research questions, revising continually as they review what they learn and make predictions based on investigation and observation. Inferences are made and conclusions drawn, using text evidence as support. Results are shared in scientific reports: a writing form unique to science, with a structure reluctant readers and writers may find more supportive and compelling than narrative forms.

Both science and literacy focus on the search for relationships. In literacy, we do this by comparing and contrasting across stories or through genre studies. Scientists explore relationships with variables, asking, “What would happen if I changed one thing?” The ability to view information from different angles is crucial for scientists, who must consider all possibilities as they work to make sense of their data. This is critical work for readers and writers as well.

Taking the lead

Engagement, interest, and authenticity are keys to cultivating the desire to read, and they transcend disciplinary boundaries. When we provide children with inquiry tools to explore their interests, they experience important disciplinary concepts through authentic and engaging tasks.

When students explore their own real and compelling questions, the inquiry skills they use connect naturally to comprehension strategies used in literacy. Writing about what they learn is a natural extension of the inquiry process, not an add-on.

Inquiry projects provide a natural time for children to take the lead—to become experts on their topic, share what they have learned, and develop new questions to explore. These are skills that can be relied upon across the life span. ■