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How to Maximize a Knowledge-Building Approach to Literacy Skills with BrainPOP

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About the Author

Barbara Hubert, Ph.D., is the director of learning experience design at BrainPOP, where she leads the learning design of BrainPOP and BrainPOP Jr. Dr. Hubert began her career as an elementary school special education teacher, working for over ten years in public and charter schools in New York City. She established the vision and direction for creating equitable instructional access as a curriculum and instruction manager at New Visions for Public Schools. Her research focuses on traversing the space between discourses of learner difference and equitable and inclusive research-based instructional practice.

Executive Summary

Literacy skills are critical for learning in all parts of the curriculum and serve as a prerequisite for academic and long-term career success. Literacy is far more than the ability to read and write a text. It is the ability to do so in order to learn, communicate, and make meaning of increasingly complex and varied texts and ideas. It is not surprising, then, that literacy and content learning are deeply intertwined. Ensuring all students develop high literacy levels alongside content understanding is crucial. Additionally, school districts are grappling with the significant impact on student learning due to the COVID-19 pandemic. A 2021 McKinsey & Company study found that K-12 students were at least four months behind in literacy development. While the scale of the challenge may be novel, addressing skill gaps and misconceptions is a necessary and natural part of the teaching process.

Literacy and comprehension are both critical to the learning process. Cognitive scientists have found that students must have the relevant background knowledge in order to learn new information. However, comprehension is also one of the primary tools through which students build their background knowledge. Relying solely on written text to build background knowledge limits access to rigorous, engaging grade-level content for struggling readers. This is how something as natural as unfinished learning leads to achievement and opportunity gaps. Closing literacy gaps requires purposeful re-engagement with a subset of grade-level literacy skills that are essential prerequisites for future learning.

BrainPOP learning experiences are designed so that all students have entry points and opportunities to develop high-impact literacy skills while building essential grade-level content knowledge. BrainPOP movies act as accessible visual and spoken texts so, regardless of reading level, students can practice and apply complex grade-level comprehension skills, leveling the playing field to build knowledge and key vocabulary. The remaining sections of the paper detail how educators can use BrainPOP learning activities to build understanding and close literacy skill gaps.

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The importance of developing literacy skills is well-documented. Literacy skills are not only foundational for school-based learning but play a role in long-term outcomes (e.g., high school graduation rates, college enrollment, and career readiness), as early as third grade (Lesnick, Goerge, Smithgall & Gwynne, 2010). Richard and Jo Anne Vasca, authors of Content Area Reading: Literacy and Learning Across the Curriculum, noted that "[Students] entering the adult world in the 21st century will read and write more than at any other time in human history. They will need advanced levels of literacy to perform their jobs, run their households, act as citizens, and conduct their personal lives."

Literacy is more than just the ability to read and write basic text— it is the ability to read, write, speak, listen, and think in order to learn, communicate, and make meaning of increasingly complex and varied texts and ideas. It is not surprising, then, that literacy and content learning are deeply intertwined. So, whether students are performing below grade level in reading, need more challenging material, or can read and write on grade-level but are unable to transfer literacy skills across content areas - ensuring that all students develop high levels of literacy while building content understanding is critical.

Additionally, school districts are grappling with the significant impact on student learning due to the COVID-19 pandemic. A 2021 McKinsey & Company study found K-12 students were at least four months behind in literacy development. In many ways, the instructional challenges that school districts are facing are unprecedented. Students are returning to school with significant anxiety and trauma, likely caused by the unfinished learning they experienced. While the scale of this challenge may be novel, educators have long struggled with addressing skill gaps, incomplete learning, and misconceptions in their students.

Unfinished learning often leads to pull-out interventions that separate students from their peers. And relying solely on written text to build background knowledge limits access to rigorous, engaging grade-level content for struggling readers. This is how something as natural as unfinished learning leads to achievement and opportunity gaps. A knowledge-building approach to literacy can mitigate this impact.

A Knowledge-building Approach to Literacy: What learning science tells us

Word recognition—and to a lesser extent, fluency—involves a finite set of skills that, when practiced systematically, usually lead to success. But comprehension is different. It's not just a reading process. It's inextricably connected to the process of learning in general. And cognitive scientists have found that the key factor in learning new information is how much relevant information you already have. In a 2022 Forbes article Natalie Wexler, the author of the book "Knowledge Gap", points out this is because:

> *"...the aspect of our consciousness that takes in new information, our "working memory," is easily overwhelmed. Until we become fluent readers, we have to juggle things in working memory like how to decode unfamiliar words and where to put the emphasis in sentences, in addition to the new information in the text. The more information we have in long-term memory that's relevant to the text—whether that's knowledge of the topic or general academic vocabulary, or both—the more capacity we have in working memory to understand and retain new information."*

Wexler (2020) argues that a narrow focus on discrete skills has been detrimental to understanding the role comprehension plays in closing learning gaps in literacy. "Cognitive scientists have known for decades, the most important factor in comprehension is not generally applicable skills like finding the main idea—it's how much knowledge and vocabulary the reader has."

In fact, comprehension is one of the most complex aspects of literacy. It involves the interaction between the skills and cognitive processes of the reader and the linguistic characteristics of a text. The reader needs to integrate text information with prior background knowledge to form a mental representation of the meaning of the text (Smith, Snow, Serry & Hammond, 2021). Comprehension relies more on strong background knowledge than mastery of replicable skills, like making inferences (Lent, 2012). When reading, background knowledge provides vocabulary, bridges logical gaps that writers leave, ties ideas together, leaves room in working memory, and guides the interpretation of ambiguous sentences (Willingham, 2021).

Depth of vocabulary knowledge is also critical for comprehension. A student's ability to make sense of grade-level texts depends upon adequate vocabulary. When students encounter texts with too many unfamiliar or challenging words, they have difficulty comprehending and developing the skills and strategies they need to grow as readers (National Reading Panel, 2000; Ouellette, 2006). Students benefit from explicit and implicit vocabulary instruction through frequent word exposure (Lemov, Driggs & Woolway, 2016).

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The key challenge: comprehension is a dynamic and complex cognitive process that relies on the interdependent relationship between background knowledge, vocabulary and literacy skill application. That is, comprehension requires and relies on background knowledge and vocabulary but it is also one of the primary tools through which that knowledge is built. Thus, it is critical that curriculum choices and instructional techniques, such as questions asked, support the development of background knowledge, vocabulary and the complex cognitive skills exercised when making meaning of a text (Lemov, Driggs & Woolway, 2016).

Adding complexity to this challenge is the ever-pressing need to close learning gaps in literacy. In a recent report, the Council of Great City Schools (2020) introduced principles to address unfinished learning, with specific suggestions for supporting literacy development. These include:

• Maintain grade-level content and instructional rigor;
• Focus on the depth of instruction rather than the pace;
• Prioritize content and skills that are foundational to progressive grade-level expectations;
• Maintain the inclusion of each and every learner;
• Identify and address gaps in learning through instruction.

Enacting these principles requires purposeful re-engagement with a subset of essential literacy skills that are prerequisites for future learning. Student Achievement Partners (2021) builds on literacy research and learning progressions to identify high-impact literacy skills that are essential for meeting grade-level standards across states - ones that support close reading with ample opportunities to build knowledge through comprehension and vocabulary acquisition. The table below represents many essential literacy skills that progressively support knowledge building across K-8.

Reading	Writing	Language
Make logical inferences from explicit details; cite specific evidence to support conclusions drawn Determine central ideas and summarize the key supporting details and ideas Interpret words and phrases as they are used in a text Integrate and evaluate content presented in diverse media and formats	Gather relevant information from multiple print and digital sources Assess the credibility and accuracy of each source Draw evidence from literary or informational texts to support analysis, reflection, and research	Determine or clarify the meaning of unknown words by using context clues and analyzing meaningful word parts Demonstrate understanding of figurative language, word relationships, and nuances in word meanings Acquire and use accurately a range of general academic and domain-specific words and phrases

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Knowledge-building Literacy Approach with BrainPOP

BrainPOP learning experiences are grounded in research. They are designed to develop essential literacy skills while building grade-level content knowledge. Each part of the learning arc supports a complete learning experience easily adapted to different concepts and classrooms. Sections below detail how educators can use BrainPOP activities to build understanding and close skill gaps.

1 Build Knowledge

2 Apply and Assess

3 Deepen and Extend

Building Knowledge and Literacy Skill: BrainPOP Movies and Pause Points

Animated movies are the heart of every BrainPOP learning experience. The movies introduce and build background on complex topics across the curriculum using humor, playful animation, and dynamic narratives to engage and connect with students. A cast of characters guides students through key concepts and models essential literacy skills, bringing standards-based content to life.

BrainPOP movies offer explicit and implicit exposure to topic vocabulary that support essential literacy skills like interpreting the use of words and phrases. Characters strategically use tier two and tier three vocabulary in movie dialogue so students can contextually infer meaning. In addition, important vocabulary and concepts are highlighted with black text boxes throughout the movie. This cues students' attention to the word's meaning and importance.

BrainPOP movies also act as accessible visual and spoken texts so students can practice and apply complex grade-level comprehension skills, leveling the playing field to build knowledge and key vocabulary regardless of reading level.

"Ecosystems" Movie

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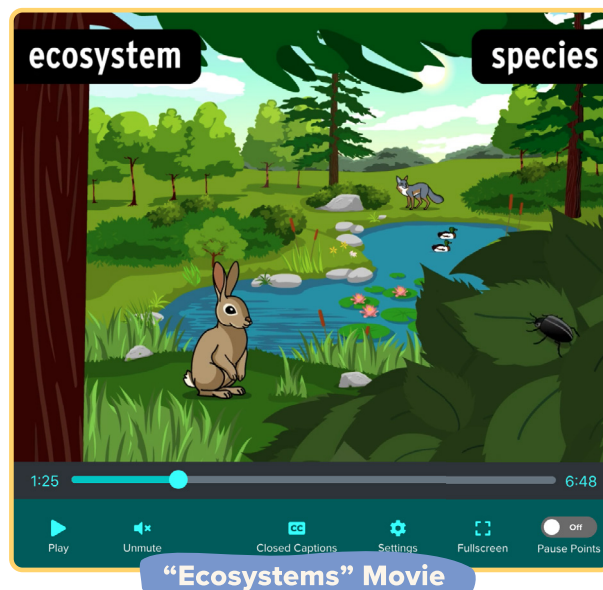
Movies include Pause Points which provide students with opportunities to stop, think, and express their ideas about what they are watching in a variety of ways. Pause Point questions and prompts scaffold understanding of grade-level concepts introduced in a BrainPOP movie while developing essential literacy skills that aid in meaning-making, vocabulary acquisition and language development. Open responses can be typed, spoken, or drawn based on students' preferences.
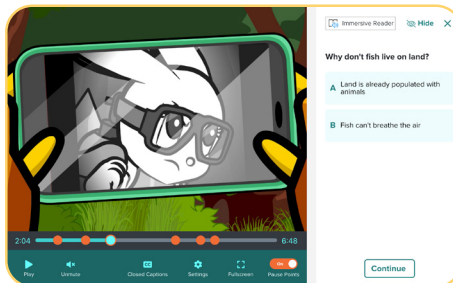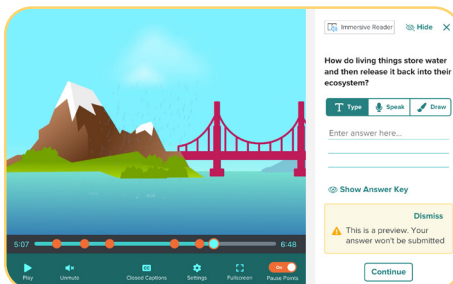
"Ecosystems" Pause Points
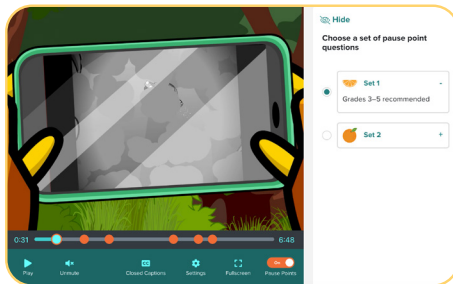
Hide

Choose a set of pause point questions

- 🍊 **Set 1**   -
  Grades 3–5 recommended

- 🍊 **Set 2**   +

Why don't fish live on land?

A   Land is already populated with animals

B   Fish can't breathe the air

How do living things store water and then release it back into their ecosystem?

T Type   🎤 Speak   🖌 Draw

Enter answer here...

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Applying and Assessing Knowledge and Skills: BrainPOP Quizzes and Challenges

BrainPOP Quizzes and Challenge activities support the development of essential literacy skills in several ways: (1) opportunities for application of skills with feedback, and (2) formative assessment of skills with actionable data for future skill building.

BrainPOP Quizzes contain 10 multiple-choice questions that engage essential literacy skills and assess important concepts covered in the movie. BrainPOP Challenge activities prompt students to apply critical thinking and skills in playful ways to demonstrate what they know and can do. Challenge activities include text highlighting, diagram labeling, matching, multiple response, sequencing, concept mapping, cloze sentences, and Venn diagramming. Both quizzes and Challenges are auto-graded so teachers can view student performance in their dashboard.

"Ecosystems" Challenge

"Ecosystems" Quiz

Deepen and Extending Learning: BrainPOP Creative Tools and Learning Activities

Embedded in every BrainPOP topic is a set of open-ended projects and activities that deepen the development of essential literacy skills and offer flexibility in meeting instructional goals and learner needs. Creative projects allow students to generate, plan, and produce, authentically showing what they know about a BrainPOP topic while practicing and applying skills. For example, students use Make-a-Map, BrainPOP's concept mapping tool, to visually express their thinking by making authentic connections between existing and new ideas. Make-a-Movie prompts students to produce a BrainPOP-style movie using images, labels, and computer- or student-recorded narration. Activities like analyzing primary sources, using vocabulary in context, completing graphic organizers, and playing learning games provide even more opportunities to apply and develop essential literacy skills in meaningful and engaging ways.

"Ecosystems" Primary Source

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