Engaging middle school students in complex science texts

In middle school, students should build on what they have learned in the elementary grades by using a variety of strategies to make sense of increasingly complex science texts—ideally through an approach called Active Reading. Active Reading is a student-centered process of thoughtful, reflective reading where students work to unpack meaning as they read. As they read, students deepen their understanding by leveraging their background knowledge and working to uncover places where they do not understand the text; in addition, they are encouraged to ask and answer their own questions through careful rereading, discussion with peers, and making connections to what they are investigating.

Active Reading situates students—their personal ideas, questions, and curiosity about what they read—at the center of science reading instruction. In order to personalize and focus students’ engagement with the text, the Active Reading approach supports students in making annotations as they read. Student annotations can include questions about the content or about ideas or words that need clarification; comments about things in the text that are surprising, confusing, interesting, or that need further investigation; and connections to what they are learning in class, to the outside world, and to other disciplines and ideas.

Active Reading is an approach to engaging deeply with texts in ways that are particularly suited for the science classroom. As students discuss each article with their peers, they are prompted to cite evidence from the text. Students are taught to closely examine and analyze embedded data provided in text in order to both better comprehend what they are reading and to use the data as evidence. Each article or text becomes a resource that students can return to and refer to as they continue to investigate ideas and try to solve an engaging, real-world problem. In inviting students to work together to understand a challenging text, Active Reading takes advantage of the social nature of the middle school learner.
What Active Reading looks like in practice

The first crucial step in Active Reading is teacher modeling. The teacher reads part of the text aloud and thinks aloud as she does so, drawing from her own skills and knowledge as both a science teacher and science practitioner that she brings to bear when interpreting the text. After articles are introduced through modeling, students read each article twice. The first reading allows students to get the gist of the article and raise their own questions and comments. Students should then be guided to reread the article, or part of the article, for a particular purpose, such as to examine a specific visual representation, to answer a question, to find evidence to support a claim, or to draw conclusions across texts.

Example of teacher modeling:

An excerpt of student text is read aloud by the teacher

*In some ecosystems, the population of jellies has increased so much over a short period of time that people call it a population explosion. Ecologists, fishermen, and many other people around the world are concerned about jelly population explosions.*
The teacher models her thinking

During this step, the teacher should emphasize the importance of making deeper connections.

It says that when populations increase a lot very quickly, this is sometimes called a population explosion. When I first think of an explosion, I think of fireworks or something exploding, and that doesn’t quite make sense. Why would this be called a population explosion? I have heard the term population explosion before, though. When something explodes, it goes from being smaller to much larger all at once. I think that is what this means.

The teacher models annotating the text

The teacher could choose to highlight population explosion and add a note:

“when a population goes from smaller to larger very quickly”
The two reads

Active Reading involves two reads. Students are encouraged to begin by annotating the text, taking notes, and recording questions as they engage in the first read. After they read, students discuss their questions and other annotations with partners, and both students dig back into the text in order to help each other answer their questions or to gain more insight into an interesting point. The teacher can later use these student-generated ideas and questions to inform further class discussions of the text, helping the class to grapple with important ideas in the text and come to a greater understanding that is based on students’ genuine questions. **This first read is individual and allows students to become familiar with the content of the text and the way in which it is presented.**

The second read has a particular purpose, such as to examine a specific visual representation, answer a question, find evidence to support a claim, or draw conclusions across texts. **The reread is thus more focused, and includes a close reading of a particularly complex section of the text and/or visual representation.** After both the first and the second reading, students are given the chance to discuss the text with peers. Students always annotate during the first read, and may also annotate during the second read.
Active reading should be introduced early on in the unit or year and be built upon and scaffolded in all subsequent units. The approach can take up more than one period of instruction for a feature text, and a portion of a session for reference materials or less substantial pieces.

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Text design for accessibility

As with texts designed for the elementary grades, middle school texts are written to provide appropriately complex science texts that support, link to, and expand their firsthand science learning. The science and literacy instruction surrounding the texts scaffolds students’ access through careful attention to reader and task considerations of complexity. All students should read the same core texts and the level of scaffolding for students should be adjusted to meet individual needs.
The mission of the Lawrence Hall of Science is to inspire and foster learning of science for all, especially those who have limited access to science. The Hall investigates, creates, and evaluates educational materials and methods, professional development programs, and hands-on learning experiences for schools, communities, homes, and their science center. To address the challenges in science, technology, engineering, and mathematics (STEM) education today, they have created a comprehensive set of programs to help increase the quality and quantity of science learning that children get both in and out of school.

**Amplify Science**

Authored by the curriculum experts at UC Berkeley’s Lawrence Hall of Science, Amplify Science is a program designed to guide students to understanding that reading, writing, and talking are essential practices of science. Built in collaboration with literacy expert Dr. P. David Pearson, the program blends best practices in both literacy and science instruction to develop students capable of clearly articulating claims and building increasingly sophisticated arguments orally and through writing.

A rich blend of physical materials and digital learning tools, the multimodal program includes: detailed lesson plans, hands-on activities, scientific texts, robust simulations, engaging media, physical and digital models, formative and summative assessments, and a variety of embedded teacher supports and professional development options.

To learn more about Amplify Science, visit amplify.com/science.