

## Recommended Mathematical and Literacy Skills for Science Proficiency

As a student's mathematical skills and experiences expand, so does his or her capacity to analyze, describe, and predict a broader range of natural phenomena. The science standards will explicitly develop along with and parallel to the Tennessee mathematical standards for grades K-12.

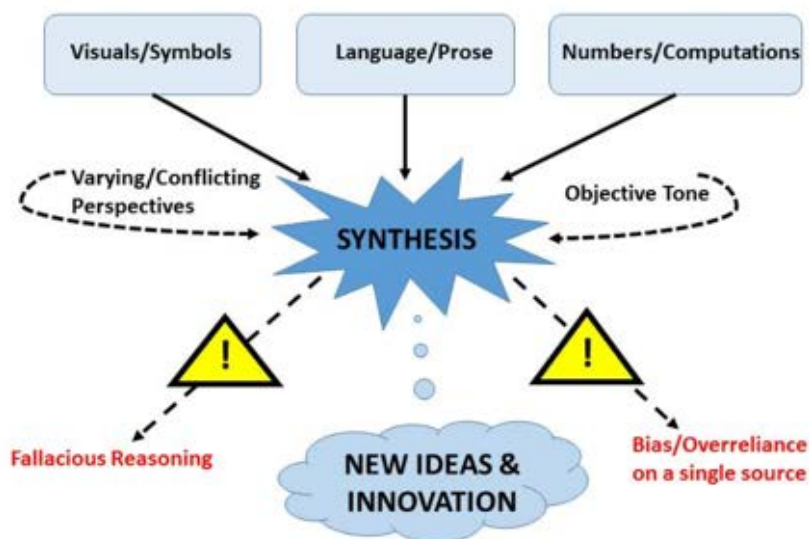
Effective communication within a scientific context requires students to apply literacy skills in reading, vocabulary, speaking and listening, and writing. Scientific information is presented in many formats with various tones and perspectives. Students must process and synthesize information effectively to generate new conclusions and ideas while avoiding the pitfalls of fallacious reasoning and bias.

**Reading:** Students should have regular practice with complex text and academic language beyond the textbook, such as scientific journals, popular magazines, and vetted Internet sites. Scientifically literate students should be able to read and decode information presented in multiple formats, including charts, tables, info graphics, and flowcharts.

**Vocabulary:** Understanding and applying scientific vocabulary correctly is essential to science literacy. Scientifically literate students appropriately link technical and academic vocabulary words in the communication of scientific phenomena.

**Speaking and Listening:** Scientifically literate students listen critically and engage in productive discussions surrounding a critique of scientific evidence and the validity of resulting conclusions.

**Writing:** Writing in a science classroom does not mimic that of writing in an English language arts classroom. Students in early grades should begin to employ technical writing skills to strengthen sequencing skills, as done through the writing of procedures. In high school, students should be able to write a report complete with introduction, methods, results, analysis, and conclusion.



Students should be experiencing science content in a way that incorporates literacy to help build the foundational skills of observation, explanation, and argumentation.

**Students' Responsibilities:**

- Use scientifically focused speaking and listening skills on a daily basis.
- Interact with data presented in multiple ways:
  - Visually through charts, graphs, infographics, and traditional text
  - Auditorily through podcasts and multimedia production
  - Tactically through the use of traditional lab experiences and non-traditional lab simulations
- Present data and findings in multiple ways
- Build an appropriate scientific academic vocabulary

**Teachers' Responsibilities:**

- Encourage the use of science and engineering practices to guide the development of literacy skills in science
- Provide a balance of appropriate sources beyond the textbook
- Provide opportunities for students to engage one another in critical discussion and argument surrounding specific content as well as data presentation
- Give consistent feedback on student writing and presentation
- Guide student research and access to content specific information from articles and journals while intentionally focusing on gaps in academic vocabulary

**Leaders' Responsibilities:**

- Support teachers in text selection, developing writing experiences, and encouraging content level collaboration as well as collaboration with English/Language Arts teachers
- Support teachers in choosing classroom activities that provide opportunities for discovery, inquiry, and the communication of scientific phenomena in multiple forms

## Scientific Literacy vs. Literacy

