

Focus on High School Science

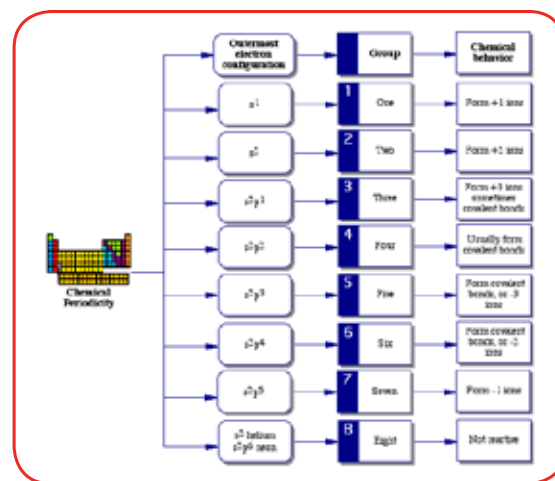
The role of high school science is to help students make discoveries about their world, while facilitating the development of more sophisticated problem-solving skills. These classes can often be the most challenging subject for many students, as they frequently need help making sense of complex and abstract concepts as well as technical text.

Many high school science teachers rely on Inspiration® software to help their students comprehend this challenging coursework. With Inspiration, students use graphic organizers to visually represent concepts and ideas by gathering data and analyzing information, then organizing that information into a written report or presentation. A proven strategy for improving academic performance across the curriculum, graphic organizers help high school science students understand abstract concepts, improve sequential thinking, comprehend complex text, and improve writing and presentation skills.

► Understanding abstract concepts

Many concepts in science cannot be directly observed, which can make these ideas challenging for students to comprehend. Creating concept maps in Inspiration helps students visually break up abstract concepts into individual components. From there, students create connections among the pieces of information so

they can understand the relationships between the parts of the whole. For example, in a lesson on chemical periodicity, a diagram helps students visualize the relationship between electron configuration and chemical behavior—illustrating how seemingly small changes have a powerful effect on the chemistry of an element.



Graphic organizers help students understand how complex systems are organized.

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CASE STUDY

Dr. Paul Rutherford—"Principles of engineering" teacher at Summit Technology Academy in Lee's Summit, Missouri—uses Inspiration to help his students prepare for their field work. Teams of 3-4 students are partnered with staff at the local public works departments. The groups are charged with thinking through all of the issues involved with developing land for residential and business uses, including water and sewer requirements. The work

requires that all of the students understand the fundamentals of force and how they apply to liquids in motion. Prior to both field work and any classroom lessons or activities, Rutherford has his students use Inspiration to create concept maps of their current knowledge of Newton's Laws of Motion. After gathering and analyzing more data about Newton's Laws through extensive class work, the students go back and create another concept

map of those same principles. "Comparing the two concept maps lets both me and my students see their conceptual development," Rutherford says. "After they've done the second concept map, their earlier misconceptions are plain to see. These Inspiration concept maps are building blocks from which they can have a meaningful and productive experience out in the field."

• Improving sequential thinking

Understanding science requires students to engage in step-by-step, sequential thinking and to draw on concepts that they have previously studied. By having students use Inspiration to create a concept map of a scientific construct, a teacher can clearly see if students understand key ideas and how those ideas relate to one another. Reviewing student concept maps allows the teacher to pinpoint where students have mastery and where they need additional instruction.

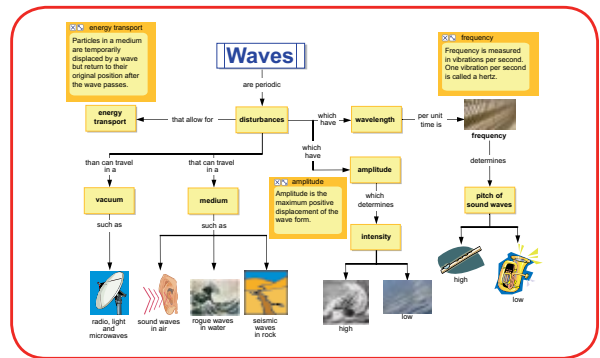
• Comprehending complex text

Creating a graphic organizer helps students represent complex scientific text. By visually mapping out each idea as they read, students uncover hierarchies of relationships, separating key concepts from supporting ideas. Being able to view both the larger picture as well as the smaller components of an idea, theory or concept, helps students form a better overall understanding of how complex systems operate. This process of breaking down challenging text and mapping it by its components helps students integrate new concepts in with those they already understand.

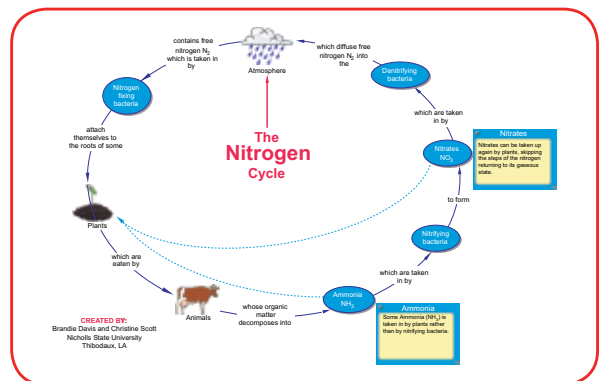
• Improving student writing and presentations

The key to clarity in writing about science is organization. Using Inspiration, students easily identify, manipulate and arrange their ideas. Visual diagrams developed through brainstorming and data gathering are instantly transformed into an outline that shows the same ideas in a textual format. In the Outline View, students organize and reorganize the flow of information to structure their written work. Once it's clearly organized, Inspiration makes preparing presentations and portfolios engaging and dynamic. Students can hyperlink their presentations to relevant web resources, graphics about research data and other documents. Video and sound such as QuickTime® movies and MP3 files can be inserted directly into Inspiration. The easy-to-use Site Skeleton® export tool allows students to develop and organize a web site, then seamlessly convert it to html.

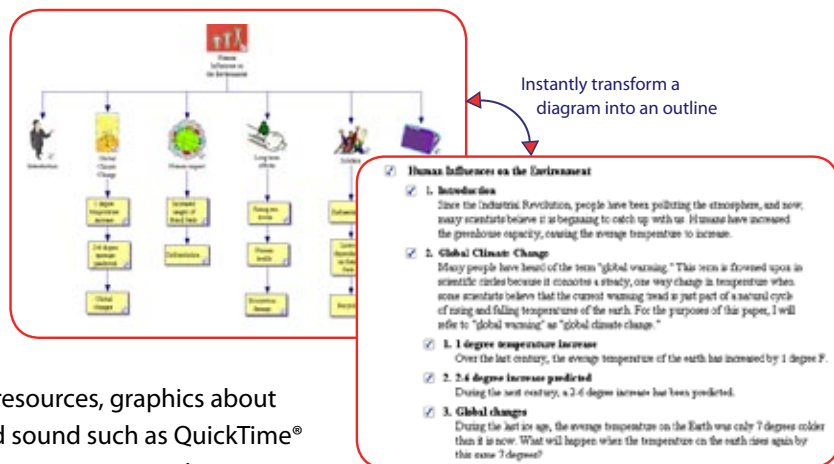
Integrating Inspiration into the science classroom gives students the tools to analyze, interpret, illustrate and present complex scientific concepts. When their work is presented visually, students find the relationships between stages of a process easier to understand and explain. Using concept maps, students can deepen their understanding of ideas and abstract information while discovering the interrelationship between components. Inspiration provides students and teachers a proven framework for meeting curriculum goals in science.



Concept maps help students deepen their understanding of concepts and the interrelationships between components.



Relationships between stages of a process are easily explained and understood when presented visually.



Working in Diagram View helps students see how concepts are related, while the integrated Outline View provides an easy way to bring writing into the science curriculum.

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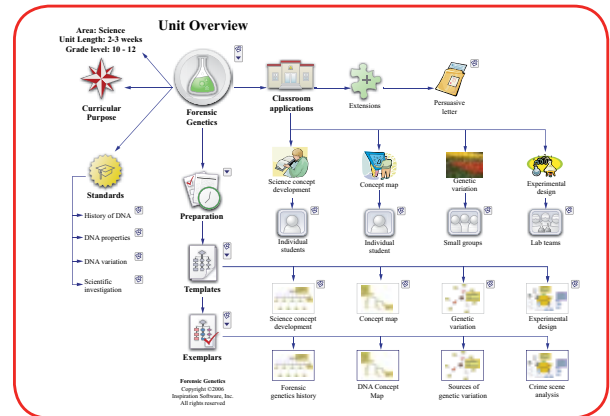
► Getting Started

Curriculum Packets

With an Internet connection, educators have access to standards-aligned instructional units that help science teachers effectively integrate visual learning into the high school science classroom. Each comprehensive online Curriculum Packet provides an integrated unit plan with multiple templates and exemplars of high-level student work.

One example is the unit on Forensic Genetics, which supports students as they explore a specific application of the basic science of molecular genetics to the societal problem of solving crimes. The unit overview cites specific standards addressed by the lessons, provides templates to help students understand and analyze

the concept of DNA and apply this knowledge to the analysis of a crime scene, and offers an extension for further study.



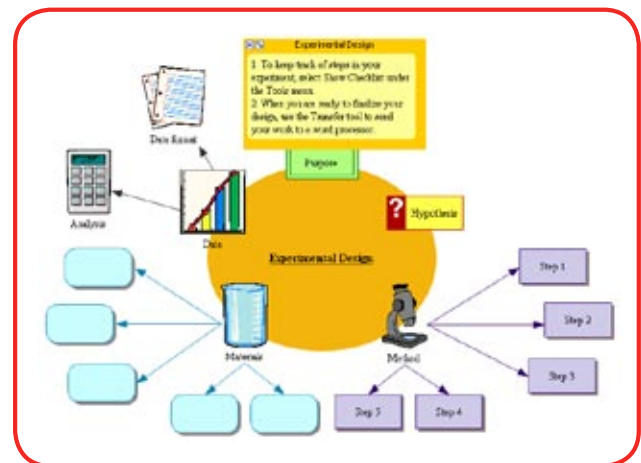
Templates

Inspiration includes 80 templates specifically designed for use with science classes. These templates offer teachers a ready-made starting point for introducing visual learning strategies into the classroom, while providing students with an easy-to-understand structure for beginning their work.

One example is the *Classification template*, which develops the type of thinking skills frequently required

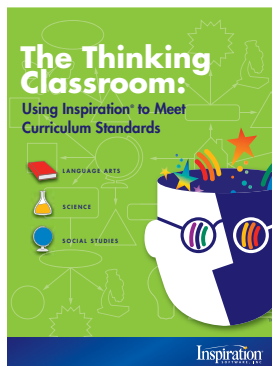


in coursework aligned to state and national science standards. By following the template's sequence, students practice the fundamental process of characterizing, classifying and grouping objects, concepts and organisms.



Other Inspiration templates include activities designed to help students design experiments, organize lab results and explore historical endeavors by creating biographies of scientists or major scientific innovations. All of the templates may be modified by teachers to meet a specific curricular need.



Lesson Plan Book

For more great ideas on integrating Inspiration software into your existing science program, order *The Thinking Classroom: Using Inspiration® to Meet Curriculum Standards*. This lesson plan book supports teachers as they help students develop critical thinking strategies.

This innovative teacher resource book takes a new approach by offering in-depth explanations of visual learning's role in mastering fundamental thinking skills such as determining cause and effect, making comparisons, decoding ideas, generating questions, evaluating information and testing one's knowledge. Each section of the book includes an overview of the cognitive strategy, examples of Inspiration templates, and curricular applications in language arts, social studies and science.

Special thanks to the following for their invaluable contributions to this paper:

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