Technology, when properly used as an integral part of the curriculum and the instructional approach, can be a very effective tool for improving and enhancing instruction and learning experiences in the content area involving all students in complex, authentic tasks. (Kimmel, Deek, & Frazer, 2001)
In the information age, classroom emphasis is changing from teaching to student learning, as the role of the teacher transforms from instructor to facilitator. As the saying goes, the teacher is no longer “the sage on the stage” but is rather the “guide by the side.”

The use of technology in teaching science has advanced more rapidly than perhaps any of the other disciplines. Both teacher and student use a variety of technologies well beyond the simple applications of word processing and multimedia. Motion sensors, computers, and air tracks are used for velocity and acceleration studies in the physics laboratory. Specialized microscopes and computer programs enhance observations of cells and genetic material in biology. Instrumentation, such as resistivity meters, is taken into the field for indirect geophysical measurements to identify subsurface rock units and locate sources of petroleum and water.

**Historical Evolution of Science-Based Technologies**

In the early 1960s, science technologies consisted primarily of filmstrips and movies with all their associated limitations and problems. As newer technologies were developed, experts warned that science teachers would become obsolete, and computers would replace instructors. Of course, that simply has not happened. More and more, as the previous quote proposes, technology is accepted as a tool to enhance instruction not to replace it. Even now, as distance education becomes more popular in the science classroom, many teachers and students believe that technology eliminates or severely limits the teacher–student and student–student interaction so integral to learning.

As science instruction moved into the 1990s, technology changed from filmstrips and movies to overheads, videos, World Wide Web, and computer simulations. With the introduction of the digital camera, students found themselves in the role of scientist, developing a keener set of science process skills. For example, active, inquiry-based oceanography exercises use the National Oceanic and Atmospheric Administration (NOAA) Internet site to investigate basic differences in salinity and temperature in various parts of the ocean during different seasons. This data is used at a more sophisticated level, with temperature and salinity variations and basic surface water circulation statistics to determine interactions between the ocean and the
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