The advance of electronic technologies throughout the past century has encouraged corresponding interest in potential applications of these technologies in schools. Thomas Edison, for example, expressed a hope that invention of the motion picture might revolutionize schools (Saettler 1990). The motion picture did not revolutionize schools, nor did any of the other twentieth century technologies – radio, educational television, the audio and video recorder, etc. – that followed. The reasons for this are embedded both in the structure of schools and in the nature of the electronic media available. An understanding of both schools and electronic media is therefore needed to understand past limitations and future potential.

Recent technological advances are now altering key aspects of society itself in what has been termed an *Age of Participation*. The active participation in society at large has engendered interest in similar advances in schools through what has been termed E-Learning. Broadly speaking, the term E-Learning encompasses any form of electronic learning, such as viewing instructional videos. However, the currently understood meaning of the term is computer-mediated learning, often Internet-based. E-Learning can supplement or replace traditional, face-to-face instructional practices.

Much of the initial development of E-Learning has taken place in higher education, specifically through the evolution of online courses. The current generation of E-Learning tools and practices largely replicate previous instructional strategies and focus on delivering information. The new developments in web-based technologies in society at large, however, offer opportunities for more dynamic, interactive instructional models in schools.
18.1 Twentieth Century Learning

E-Learning does not emerge from a vacuum. The current dominant model is non-interactive, linear, and teacher-centered. The role of the instructor is to deliver information; the role of the student is to absorb it. While modern teachers employ a variety of instructional strategies, including interactive components such as simulations or dialog, the transmission paradigm controls the classroom. In history classes, the most common instructional activity for teachers is the lecture. At many universities, adjunct faculty members are termed lecturers. In medicine, interactive, teaching-by-example grand rounds are being replaced by PowerPoint-driven lectures (Altman 2006).

Changes in technology have driven changes in instructional paradigms. The proliferation of technologies in the twentieth century reinforced and accelerated the supremacy of didactic instruction. At the beginning of that century, the most recently adopted innovation in education was the blackboard. These monoliths replaced smaller and cheaper individual slates. The smaller slates encouraged groupwork or individual consultations between the students and the teacher. The wall-mounted blackboards, by contrast, allowed the teacher to present to the whole class at once. The twentieth century additions of film, radio, television, and the overhead projector added new options, but the instructional paradigm remained the same.

The microcomputer has presented a puzzle to educators. Should the computer be a tutor, a tool for composition, or a tutee to be programmed by the student (Taylor 1980)? Decades after being introduced, educators are still grappling with how to integrate one-to-one computing into instruction (Bork 2003). While computers in the classroom can support a lecture-based model of instruction, they also invite a much higher level of interactivity and student engagement than a didactic approach.

18.2 Educational Technology and Instructional Practice in E-Learning

Advancements in educational technologies have served to encourage or inhibit four characteristics in instructional design: interactivity, scalability, media-richness, and granularity. Table 18.1 presents a selection of educational technologies in rough chronological order of their introduction and notes their characteristics. (For a more encyclopedic discussion of the development of educational technologies, see Saettler 1990).