Teaching, Learning, and the Impact of Multimedia Technologies

By Tony Bates

Developments in the Internet, particularly the World Wide Web, and in multimedia technologies are resulting in new approaches to designing and developing teaching and learning in higher education. Some of the
The ability, through Internet technologies, to present content, give structure to it, and enable learners to adapt what they learn to their needs to become more learner-focused. Thus the role of the teacher is by no means random or chaotic elements. One of the critical areas of the design of educational multimedia is the interface. A well-designed interface is intuitive for the learner, in that the learner can navigate easily and knows immediately what he or she is expected to do. The interface allows the learners to focus on learning, which is another feature that is appropriate to the learning context.

Learning in the twenty-first century will be increasingly bound up with work and everyday life. It will be required on demand and will be organized in such a way that it fits the lifestyle and needs of individuals. Learning and teaching are two complementary aspects of education. Within learning, there are two key elements to be considered: the content of learning, and skills, which describe how something is learned. Multimedia can represent knowledge in more ways than text or speech can. Multimedia combines text, audio, visual, graphic, and dynamic elements, such as animation and video. This presents learners and teachers with unique learning resources that are used in a wide variety of ways to stimulate various forms of learning.

Presentation Multimedia can represent knowledge in more ways than text or speech can. Multimedia combines text, audio, visual, graphic, and dynamic elements, such as animation and video. This presents learners and teachers with unique learning resources that are used in a wide variety of ways to stimulate various forms of learning. The most significant feature of the multimedia is that they allow for the presentation of knowledge in numerous ways. Thus students can learn about abstract principles through text and can see the application of those principles through an animation or a video example. This presents the opportunity for deeper levels of understanding, particularly if the presentation is adequate for the medium and through the medium with the teacher and other learners and in how knowledge is structured within multimedia.

Interaction Interaction is another term much beloved by multimedia designers but very rarely adequately used or understood in an educational context. There are several kinds of interaction. The first is the interaction of the learner with the machine. As the sophistication of multimedia design has increased, so have the types and forms of interaction, although so far they have been rarely exploited in an educational context. The most dominant physical form of learner-machine interaction today in education is a very old-fashioned operation that was developed in the nineteenth century and that requires a high level of prior learning and dexterity: typing. Another primitive but very dominant form of interaction, especially on the Web, is the use of a mouse to click on “active” buttons. Other forms of interaction possible with a computer include drawing, speaking (voice recognition), gesture, and singing. It is surprising that these other forms of interaction are still so little developed, since they would be especially useful for computer applications in schools.

Research over the years, however, has improved the design of computing systems to take into account the way humans like to interact and the expert systems that are developed to allow the learners to begin to be able to draw on their own knowledge and experience, and they need to be able to adapt what they learn to their own particular circumstances. In other words, education for lifelong learners needs to become more learner focused.

Teaching and learning are two complementary aspects of education. Within learning, there are two key elements to be considered: the content of learning and skills, which describe the application of content to specific tasks, or the “how.” These two elements are mirrored in teaching by the curriculum and syllabus (the “what”) and the teaching methodology (the “how”). Multimedia technology affects both aspects of teaching and learning. It does this in three ways: how it presents information; how in students interact; and how knowledge is structured within multimedia.

Virtual reality offers much more profound changes in the way humans can interact with machines, but at this stage we cannot accurately identify the potential benefits (and dangers) that virtual reality holds for education.

Structure The third element of multimedia technologies, and the least researched or understood, is the impact on the “structure” or organization of knowledge. Both speech and text are linear in sequence. Even in text, though, structure can be complex. For instance, in a novel, the author may write about parallel events in separate chapters or may deliberately interrupt the linear or time sequence to provide tension or incongruity in the reader’s mind. The important element of text is that the writer controls the structure. Novels and textbook authors give a great deal of thought to the sequence and structure of their works. The reader can, of course, ignore the structure and read “out of sequence” or selectively, but that may result in a tension between the goals of the writer and the reader failed by the reader. One feature of good teachers is the ability to restructure and reorganize knowledge to suit the needs of individual learners. One feature of outstanding teachers or researchers is their ability to identify patterns or structures in what would otherwise appear to be random or chaotic elements. One possible goal for a teacher is to develop the ability in students to find their own structure or understanding of the organization of an area of study. Multimedia offers a variety of ways to structure knowledge. A CD-ROM or Web site can be structured in a linear
The learner retains more control at home site acts as a study guide, with or “home” site. In educational terms, the learner can “take off” to other sites, except for the context, technology does not change the nature of teaching or learning; it does, however, make it difficult for artificial intelligence to be selective and sophisticated in our decision as to how we want to use technology, not or should not be taught solely through textbooks. Many skills cannot or should not be taught effectively in this way is probably much greater than most teachers would credit.

The Internet: Interaction and Power

For many teachers, the most important element of the Internet is the ability to bring isolated learners and teachers together for discussion and analysis. Thus, interaction is more important, and authority and knowledge gained over the Internet. How can the learner be sure of the sources of information? Even now a fundamental issue.

Knowledge in the Future

The future, by definition, is uncertain. But there are three possible scenarios for the future of teaching and learning. First, the teacher will be in control. In this context, teachers and subject experts regain control. This is quite likely to happen as the Web moves from primarily a textual and graphic-based medium to a multimedia technology as bandwidth and computer power increase. Teachers can then start delivering lectures over the Internet. However, this is likely to be a short-lived triumph, unless learners will be able to choose from alternative methods more suitable for distributed and lifelong learning. Second, the technology will be in control. This would be the final triumph of artificial intelligence. Computers will diagnose the learning problems of students, direct them to appropriate resources of information, select teaching methods, provide feedback, and assess the students’ work. I think this is very likely to happen because someone has to program the computer in the first place, and the computer is expanding more rapidly but also is becoming more distributed, thus making it difficult for artificial intelligence to control.

Third, the learner will be in control. This is perhaps the most likely scenario. Learners will take a constructivist approach to learning, seeking knowledge that meets their needs, in ways that are convenient, flexible, and cost-effective. In this scenario, technology does not act as a teaching assistant or mentors and therefore perform other functions.

Conclusions

New technologies are fundamentally changing the nature of higher education. Nevertheless, we must take a balanced between face-to-face teaching and learning. Many skills cannot or should not be taught solely through textbooks. Many skills cannot or should not be taught effectively in this way is probably much greater than most teachers would credit. The trick is to understand, first, that there are many different clients, needs, or markets for education. For some of these markets, technology-based teaching and learning is perfectly appropriate, and it is not. We need to be selective and sophisticated in our decision as to how we want to use technologies to teach and learn. Second, the role of the teacher will change, in order to exploit the benefits of new technologies. This in turn will have a major impact on our educational institutions. Third, our move to restructure knowledge and skills that can be taught effectively in this way is probably much greater than most teachers would credit.

Many skills cannot or should not be taught solely through technology, although the range of knowledge and skills that can be taught effectively in this way is probably much greater than most teachers would credit.

Knowledge is not evenly distributed. The teacher will know more in some areas than each individual student and, in some circumstances, more than the sum of all students in the class. This, therefore, raises the question of the validity and authority of knowledge gained over the Internet. How can the learner be sure of the sources of information? Even now a fundamental issue.