Chapter 4
Learning To Interact

Learning has traditionally depended on the teaching of a teacher, and the ability of students to remember what had been taught was tested by the teacher. If students received good scores, the job was done. If not, more teaching…and eventually the students moved on to the next level.

Now, learning should involve the continuous interaction of teaching and learning. Why? Because so much of what people work with changes so fast that interaction must be continuous. Continuous with what? With information resources, because now there is no single source of authoritative information like the teacher once was. Let's look at some of the continuous interactions that are part of continuous learning.

INTERACT WITH WHAT?

What is the natural world is made of? Mass and energy that is packaged in different ways. We humans have invented languages in order to share information with others. When the information "makes sense" we call it knowledge.

Teachers should not feel responsible for as much of the information delivery now as they did in the past because information can be easily accessed by anyone. The need for information can be so spontaneous that teachers become a limiting factor if information delivery depends on the teacher. There is no longer the need to assemble classes and instruct them verbally in everything they need to know because so much is or will be available in *Information Systems*. Further, teachers do not really know what their

students will need to know in the future. So rather than teaching classes as in the past, teachers and students should interact in cooperative problem-solving environments where the focus is on learning, as Perelman (1992) suggests by the title of his book "*School's Out; Learning Is In*."

Learning to Interact with Ideas

Conceptualizing is a well-developed human ability, and much of education involves the sharing of concepts. We formulate problems based on concepts. We build objects represented first by concepts. Laws are made based on conceptualizations of human interactions and preconceived judgments of the results as good or bad for society. There are so many considerations to make in modern society that it is essential that we share concepts about how things work, from individuals to governments to global networks.

We use word and number systems to represent concepts and objects symbolically and to communicate with others about them. We do this in a verbal format by talking, by the printed word, and by schematics, pictures, animations, and real-time motion. Since we now transmit much of our information electronically and global communications are so rapid, we have essentially instant access to global information resources. Organized information becomes knowledge, and knowledge becomes meaningful when we have an understanding of relationships. Expertise is rapidly becoming less an attribute of individual persons and more a property of systems and networks (Perelman 1992).

Learning to Interact with Others

Knowledge is something to develop and share rather than be held by those in authority (Hamm and Adams 1992). The new information processing technology, referred to by Perelman (1992) as hyperlearning technology, *"...makes the very status of the individual expert obsolete."*

Two major ideas loom large in the professional literature on education: the importance of social interactions and the beneficial effects of cooperative learning. Student-peer interactions are one of the two most important factors affecting performance in college (Astin 1993), and cooperative learning environments promote peer support.

Humans are social beings with incredible potentials for social complexities. Beginning with family units and extending to world government, we socialize through biology (family systems), ethics and morals (religious systems), learning (educational systems), rules and regulations (legal systems), and trade (economic systems).

Isn't it interesting that we live in such highly developed social settings and yet traditionally line students up in rows (often arranged alphabetically), treat them as isolated individuals (do your own work), tell them what they are expected to know (you will be tested on this), and then devise artificial criteria to see who is the best!

Maybe the Johnsons (1994: 10) are right in comparing the traditional classroom setting described with Herbert Spencer's argument in the 1860's that *"...Darwin's survival-of-the-fittest concept of evolution could be transposed to human society."* There has to be a better way!

Students are willing to accept responsibility for learning when meaningful opportunities are presented to them. They probably always have been, but the urgency has never been as great as it is now when learning how to learn and life-long learning have become so necessary. *When professors give students opportunities to assume responsibility for their own*

learning, students mature more quickly than when they remain dependent on their teachers.

Summarizing the environmental effects on student outcomes in college, Astin (1993) states: "*Perhaps the most compelling generalization from the myriad findings summarized...is the pervasive effect of the peer group on the individual student's development."* Is that surprising? Hardly, when we think about the dynamic interactions among college students, of the time they spend together talking, playing, studying, sharing their ideas, commiserating together, complaining...how can curriculum structure compete with that? *Professors should design learning environments that encourage and promote positive interactions among the students in their courses.*

Learning to Interact with Tools

New tools have appeared throughout the history of mankind, but never as rapidly as electronic tools have in the last few years. With the appearance of the personal computer over 20 years ago, attention began to be directed toward information processing tools to facilitate learning. In 1995, 44,000 students from 120 countries enrolled in just one on-line course on the Internet; now there are on-line universities!

With instant access to global information resources, there is no shortage of available information. Quality and relevance are the question marks, and procedures for evaluating quality and providing access to relevant information are being developed; this new approach to information access will surely improve with experience.

When desktop computing appeared in the 1980's, I began to think a lot about how learning occurs in order to design and use the new information-processing tools to maximize learning. I tried to avoid the temptation to use the computer

to do the same things quicker and slicker, choosing rather to look for more creative ways to use its power. *Information processing tools has advanced so rapidly that educators are still learning how to use it most effectively.*

Information processing tools are now embedded in word processors, office systems, and integrated modeling environments. There are spell checkers, grammar checkers, dictionaries, language translators, databases, spreadsheets, statistical analyses, code-controlled applications...the list is long and accessible simply by clicking a mouse. Icons and pull-down menus make the right tool relatively easy to find. Given these tools, shouldn't higher quality learning be expected of students than when all writing, drawing and editing had to be done manually? Shouldn't teachers expect students to solve more complex problems? Shouldn't teachers expect students to learn how to exercise their own quality control as they use these powerful tools? If teachers do not have these expectations, then the tools available are not being used as effectively as they should be. *Teachers are responsible for incorporating the use of these quality-improvement tools into the learning environments of their students; these tools are needed for life-long learning.*

Learning to Interact with Time

We interact with time by describing happenings in units of seconds, minutes, days, years, decades, and centuries. We also interact with time by reading publications and watching movies that were written or produced earlier; the record is there for us to inspect, evaluate, and compare to current levels of thinking about ideas, concepts, activities, and life.

Evaluating written records of the thinking and actions of people in earlier societies gives students and teachers a historical frame of reference. Evaluating the historical

records of changes in social systems provides a basis for understanding current society better. Students can find information now that would have taken hours or days to find just a decade ago. They can now do computer calculations in seconds that would have taken hours or days just a decade ago. Now that students can access information almost instantly from anywhere in the world, the way students and teachers interact with each other has changed. *Electronic information processing makes our ability to conceptualize more important now than ever before.*

Having computers to find information and do routine calculations frees time for students and teachers to interact at higher levels of thinking. Teachers and students should acquire the creative enabling skills together now that the technology is so readily available. *Computers should make education more human and personal, not less.*

The new century harbors changes that can hardly be imagined. Consider the potential of virtual reality, for example (see Rheingold 1991), and I'll share an example from my field. I took my students on wilderness canoe trips in Canada, and we saw beaver lodges and crossed beaver dams. Suppose each trip could have been preceded by a virtual reality exercise that showed the students the *inside* of a beaver lodge. They would surely have had a better understanding of beaver ecology when they saw a lodge in its natural setting and we could have had more meaningful discussions of beaver ecology on-site.

Learning to Interact with Information

As learners, we are always interacting with information of some kind. Traditional information, such as written materials, will be here for a long time to come. When traditional printed information is supplemented with

electronic access to information, efficiency in accessing and processing information increases dramatically. In time, electronic access will be the norm.

The potential for interactions among information processing has reached a global scale. Educators around the world have access to the Internet, as do students in homes that are connected to on-line services. More people are signing up and more services are appearing; the global communication market is vast and is becoming more and more wireless and thereby more portable.

Imagine carrying on a dialogue with someone from another country. You do not speak their language, and their English is not very good. You write in English and they answer in their language as a computer program translates both languages! Are people patient enough to translate manually after having such an electronic option available?

The amazing advances in information processing will change higher education forever. *Mouse-power is here to stay, and it is the responsibility of professors to prepare students for the future rather than the present.*

INFORMATION NETWORKS

Information processing power will increase dramatically in the future as the connectedness of information is recognized and built into information networks. The world that current students will work in will be the product of synthesized hyperlearning technology, and *"...a new smart human environment that can observe, think, make decisions, work, converse, and learn with us."* (Perelman 1992).

Electronic calculators appeared about 40 years ago, and teachers debated whether students should be allowed to use them in class, for homework, and during examinations. Some teachers wanted to deny students the opportunity to

efficiently process the information they were trying to learn! Think of the spreadsheets and computer programs now available to students...calculating power has almost no limit!

Teaching is moving in the direction of emphasizing relationships and motivating students to become life-long learners by arousing curiosity and encouraging creativity (Hamm and Adams 1992). Having students visualize, vary, demonstrate, experiment, and simulate arouses their curiosity and encourages creativity. Working with real objects is enhanced by computer visualizations, and, for objects too small or too distant or too scarce, computer visualizations are the only way students can interact with them.

Suppose you are reading about something and would like to visualize it; click on an image icon and see the picture! Suppose you are studying history, wondering what some famous person sounded like when giving a speech; click on an audio icon and listen to the speech! Suppose you are studying animal behavior; click on a video icon and see the animal in action! *Multimedia delivers many different kinds of information rapidly and timely with just a click of the mouse!*

Integrated information systems make the connectedness of information a reality with hypertext. When students are reading about something and find a word they do not know or an idea they want more information on, they can click on the key word and its definition or additional information appears on the screen. Instant information, as Perelman (1992) points out; "*...personal learning 'on-demand,' 'just-in-time,'…*" What you need when you need it.

My students began authoring, publishing, and building hypertext and multimedia capabilities into their work in 1990. When I retired from active teaching, the *Wildlife Ecology and Management Information System* in the Department's Cooperative Learning Center contained

hundreds of files authored by my students and myself that were available through subject-related menus and key word searches. There was no more efficient way to find and work with this information than with this early integrated electronic information system. In the future "…*data storage technology…will put a lifetime of information in the palm of your hand"* Perelman (1992).

CONCLUDING REMARKS

Given instant electronic access to information, the volume of information resources available is staggering. The potential for information overload is real, however. How do we select and process the relevant information? How do teachers manage information access and application with their students, avoiding the pitfalls associated with just getting information, looking at it, and considering it "done?"

We haven't seen anything yet. I don't think many educators have truly recognized the significance of interactive learning in relation to interactive processing power available in the 21st century learning environment. Educators may not be taking enough time to think about the learning process in relation to this information processing power. *What should school be like when the bell rings 10 years from now when current students will be the teachers?*