



The Learning Environment of the 21st Century

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A new year brings with it resolutions to improve and better situations. A new decade carries even greater promises of positive growth and enhancements. A new millennium, so rare an occurrence, bodes innovation in sundry aspects of life, all with the end result being massive overhaul in areas that were complacently marching along.

The coming of the new millennium encourages a new vision in education. The recent accelerated growth in technology, demographics, geography, financial considerations of institutions of higher education, but most of all the modus operandi of the student of the 21st century will contribute to the new vision. The typical college student of the next millennium is an individual with a substantial number of commitments in addition to pursuing an education. This student is maturer, more likely financially self-supporting, and more serious academically than many of today's students. The typical student of the 21st century does not reside on campus and does not have the time to commute to campus. A great number of these students will be employed full time and will pursue further education as a requirement of employment or for career advancement. The student of the next millennium will be technologically astute and prepared to take advantage of the vast potential for technologically mediated learning. Distance learning will become a commonplace phenomenon in the next century. Without distance learning vast numbers of students will not be able to further their education.

THE LEARNER OF THE 21ST CENTURY

The typical student of the new millennium will be academically independent. He will be self-motivated with an inquiring nature. This student will be able to articulate questions and will be better able to discuss academic subject matter than the students educated in today's traditional classroom environment.

These qualities are essential for success in the new model of learning. An integral component of higher education in the new millennium will be collaborative work, not only because it supports active learning, but also, because it is required for the workplace for which we will prepare our students (Levin & Ben-Jacob, 1998). The fusion between learning and work will be closer than ever before. The ability to express oneself is critical as the interaction will be necessary between learners and learners, as well as between learners and instructors.

The learning environment of the 21st century will support the learners' active questioning of instructors and content experts, as well as receiving information from them. It will support the learners' active exploration and manipulation of material. This aspect of the model is not entirely new. It aligns well with problem-based learning. Problem-based learning proceeds according to the following algorithm: first, the students are presented with the problem. Next, they attempt to solve it using the reasoning skills they possess. Interactively, they identify their learning needs. Then, they study and apply the new knowledge to the problem, and finally they describe what they have learned. In this environment the professor becomes an advisor rather than a lecturer. This educational milieu supports a collaborative process among its participants with inquiring minds (Ben-Jacob & Tucciarone, 1997). The new aspect of the learning environment for the 21st century over that of problem-based learning, is that of learning at a distance.

A further aspect of the 21st century learner is that he/she will be a lifelong learner. As the 20th century drew to a close, nearly half of all students enrolled in post secondary education were adults. If we add to this the numbers of individuals accessing post secondary level training sponsored or funded by their employers, well over half of post secondary students were adults. Trends suggest that this will increase. Multiple careers and the dependence of more jobs on rapidly changing technology means more adults will seek additional educational opportunities. Attitudes will continue to change with most people placing a greater value on continued education and perceiving themselves as lifelong learners. With the aid of technology mediated learning, especially distance learning, not only will more adult learners have access to an ever widening array of post secondary programs, but institutions will transform themselves to serve the pedagogical as well as the lifestyle needs of the lifelong learner.

The traditional marketing model for post secondary institutions has been based on attracting primarily high school seniors for a four-year stay at college or university.

This has begun shifting to include attempts to attract adults into their programs. To accomplish this, institutions have attempted to offer courses at times and places that are more convenient for the adult learner. These attempts include evening and weekend classes, as well as opening branch campuses closer to where their adult students reside. Important as these changes were, the programs have not, by and large, changed either their pedagogical strategies or their modes of program delivery to further match the needs of adult learners.

There are three tenets of the traditional model of post-secondary education that have led to pedagogical strategies that are not particularly suited to the adult learner. Learning is primarily an individual matter. Learning, at least academic learning, is achieved, in large part, through the transfer of knowledge from experts to novices. Learning that can be garnered from individuals' experiences provides little benefit toward academic learning, in spite of the fact that academic learning can inform and enrich individuals' life experiences.

The view that learning is individual has led professors and institutions to devalue collaboration. Assessing individual contributions to collaborative work raises difficulties for many. This line of thinking, however, fails to ask whether more learning and better learning occurs when learners work individually or collaboratively. Working collaboratively with one's peers exposes each learner to a wider array of questions and perspectives than working as a single learner. Students can learn from their peers and learning is reinforced as they share learning and even teach their peers. Collaborative learning is especially important for the adult learner and for the learner of the 21st century. As a full time working person, most adult learners are already comfortable working in teams to "get the job done." At work they are encouraged to question team members, share ideas, and produce collectively. Their job performance is judged in part by the performance level of the team. Academic programming designed for adults should take note of how adults work best, not how academics themselves have learned. The workplace of the 21st century will be increasingly complex and technologically dependent. Corporations will no longer value simply the knowledge and ability to learn of its individual employees (individual learning). Individuals and teams will be valued for their ability to communicate this knowledge and learning in ways that help other employees and teams use this knowledge and enhance the ability of the entire organization to operate smarter and more efficiently (organizational learning).

The view of learning as information and knowledge transfer encourages an emphasis on lectures and reading as the major learning activities within the academy. For the student these are passive activities. Learning, however, occurs with the active manipulation and exploration of content materials. Learning is a process of discovering knowledge, not merely relating facts. Ideally, this process of discovery is a collaborative one. Elementary education has applied this knowledge about learning and has begun constructing more active and interactive classrooms. The ability to read does not entail that a maturer learner will

learn in the deepest sense by reading what others have discovered. Reading is an absolutely essential tool for learning; however, if understanding is one of the goals, the learning must be active. A resident of the tropics might read a treatise on how a winter day in Minnesota feels, but he/she will understand it much better in an instant when she steps off the plane in Minneapolis.

The devaluing of life experience has led the traditional professor to ignore an important "hook" into learning, especially for the adult learner. Traditional teaching tends to begin with theory, then introduces application. It is interesting that the logic of teaching is the inverse of the logic of discovery, which moves from observation to theory. Learning is a process of discovery and should start with experiences, observations, and lead toward theory. The teaching of ethics provides an example. Ethics is traditionally taught by stating various theories of ethics as though these are alien and unknown to the learner. Problems are then analyzed from the perspectives of these theories. Rarely is it acknowledged that everyone in the class has faced many ethical problems and has usually done a fine job of reasoning through them. Professors should rely on the experiences of their students, including the students' modes of reasoning, to help them expand their knowledge and learning, not set out to recreate it.

The new millennium will also see institutions transform themselves with respect to the modes of program delivery; they will take note of lifestyle needs of adult learners of the 21st century. On the one hand, these will be busy individuals who cannot tailor their lives to the schedules of the traditional course. On the other hand, they are committed lifelong learners who expect and desire to continue learning throughout their lives.

The vast majority of post secondary programs designed for adult learners remains campus-based. Campus-based education, even for learners who only visit campus for their classes and for library resources, makes good sense on the individualist, passive, non-experiential, model of education. If learning occurs in the lecture hall and from reading, campus-based programs are sound. However, if learning requires collaborative discovery grounded in experience, then alternative environments must be created to support learning. Such environments can be created for campus based students, but this population represents a dwindling percentage of students even among traditional aged students.

COLLABORATIVE LEARNING NETWORKS (CLNs)

CLNs will meet these needs. The CLN of the future has as a fundamental characteristic, the perpetual student who has an ongoing thirst or need for learning. CLNs will employ pedagogical strategies of the collaborative discovery model of learning. Tools for asynchronous computer mediated communication and collaboration will be employed allowing learners to participate anytime, anywhere. Thus, CLNs will provide the future of distance learning. In addition to communication among learners and between learners and instructors, these tools will allow learners to interact with many more experts than are

housed on any campus. CLNs will make use of content rich computer application that will allow learners to explore and manipulate materials.

Another aspect of campus-based programs is that they are governed by an antiquated calendar system based in an agrarian culture. CLN-based learning will not be governed by such artificial constraints. It will not be composed of term courses where the number of weeks determines how much content is covered in a particular course nor where the courses are deemed to carry three mythical credits each toward a degree requiring the magical number of 120 credits. Freed from these artificial restraints, CLN-based learning will be designed around competencies. Modules will be developed for a competency, not necessarily for credits. Courses and even entire degree programs will be developed around competencies rather than credits.

The CLN of the future will exhibit greater flexibility than ever before in a formal educational experience. Students will be able to contract for the type of course they will need. The idea of fusing modules together to form the desired course will become the norm. Learning groups for each module will be formed. Ultimately, computers will perform the administrative monitoring of such a course. The role of the instructor in the CLN will be that of facilitator, advisor, and co-discoverer of knowledge. Innovative thinking will be rewarded. The overall atmosphere will promote the importance of learning over grading. Assessment will be used to help the learner understand how to improve learning more than for the purpose of assigning a grade. It will encourage diversity of opinion, diversity of intellectual thought, diversity of approaches to problem solving and diversity of cultures. Since asynchronous communication tools will be employed, classes will be comprised of learners from all over the world. Students will register for courses and study because of their desire to further their education and gain more knowledge. Competency in areas will be the priority (Dolence & Norris, 1995).

The corporation of the 21st will benefit from CLN-based learning. Corporations will be able to contract to have a group of its employees receive anything from basic skills training, to college courses, to entire master's degrees, to specialized training in a way that can be integrated into the work schedule and into the workplace. A group of workers from around the world collaborating on a project can use the same systems they use for this collaboration to receive needed training employing the methods and technologies of CLN.

The skills to work in such an environment need to be developed. The vision of education of the next millennium will not allow for an abrupt transition upon receiving a high school diploma in today's traditional classroom and immediately being adept at continuing a career of CLN-based lifelong learning. Regardless of whether or not they attend a campus based undergraduate program after high school, most people will seek additional post secondary education at various times throughout their lives. It is our contention that CLN-based distance learning will be the preferred mode of accessing this education.

ELEMENTARY & SECONDARY EDUCATION

In an article in the November/December 1995 issue of *Change*, Barr and Tagg describe a future paradigm for higher education; they do not expand their example to include secondary or elementary school. We must back the vision of the future learning environment into the lower grades. What competencies should be developed in elementary and secondary school? The high school graduate of the 21st should perceive him/herself as a lifelong learner and should have the aptitudes necessary for learning in a CLN. Since the CLN employs technology to a high degree, one might think that elementary and secondary schools should stress technology. We contend, to the contrary, that the technical skills necessary to learn effectively in a CLN will be minimal. Each generation of software becomes more sophisticated with more to learn about what it can do, but it also gets easier with new user-friendly intuitive interfaces. Two competencies that we believe will be essential for the student of the 21st century, but that are not actively encouraged in many of today's elementary and secondary schools, are the ability to learn collaboratively and problem solving. Today, as well as in the future, most successful work and play environments, require collaboration and problem solving.

In elementary school, the focus will return to the basic skills of reading, writing and arithmetic. Arithmetic, or better yet, mathematics will focus on problem solving skills rather than emphasize the mastery of such tasks as long division. By no means will the algorithm for long division be removed from the standard curriculum of elementary school, nor will the memorization of the multiplication tables, but for those students who perform less than perfectly on these type of mathematics skills, the negative implication will not be as severe. Calculators will be used all the time. This, of course, begs the question, why teach arithmetic. Mathematics has long been associated with logical thinking and algorithmic processes. These two competencies will be more essential than ever before as our learner of the future will be on her own more than before. Conceptually, one needs to learn multiplication and division.

Reading must be taught for the obvious reason. The teaching of writing, on the other hand, must undergo a metamorphosis. In addition to printing and cursive writing, an emphasis must be placed on teaching everyone some creative writing. It was long thought that there are those students who have a natural ability to express themselves by way of the written word while for others it was a major struggle. Children can be taught composition as a formal skill, for example, first practice writing topic sentences, and so forth. The ability to express oneself will be even more important than it is today. When children have difficulty with fundamental reading skills, they receive the additional necessary resources, as this skill is perceived by educators as rudimentary. Composition must be likewise perceived as a fundamental skill every child must learn.

The change in the curriculum for elementary school will be manifested in the de-emphasis of specialized subject

matter such as social studies, geography, and general science. This is not to say that children of the 21st century will not study these subjects, but educators will begin to realize that with stronger fundamental skills, the children will be able to read, comprehend, analyze, and write about whatever interests them with greater facility than before.

Today, too many schools are purchasing expensive computer equipment and not putting it to sufficient use. Many of the institutions are boasting that in fourth grade their students can already surf the Internet and retrieve information. This is good but it does not take a long time to master. These same schools do not have any instruction with regard to word processing!

By third grade, children will be learning to keyboard, as we know how fundamental a role the computer will be to education. Those children, who are fortunate enough to be doing their work on laptops already, are showing a high level of enthusiasm. In Texas, as in many other states, boards of education are deliberating how great an emphasis should be placed on computers in order for their students to succeed in this technological age (Saideman, 1997).

If our goal is to foster lifelong learning, we must instill pleasure in acquiring knowledge. The policy of assigning young children an overabundance of schoolwork so they can acquire more facts needs to be rescinded. The love of learning must be promulgated. Too many of our elementary schools teach to exams and encourage rote memorization over understanding. Teachers are often encouraged to ensure that the curriculum is covered rather than understood. All this accomplishes is making the children study the requisite material and associate learning with testing and pressure. Our contention is that this will serve to harm us in the long run.

Positive strategies to academically help the children of the next century become more avid seekers of knowledge can be incorporated into the elementary school as early as kindergarten. Learning groups for building with blocks or painting a giant mural encourage teamwork, organization, and planning for execution. With the teacher acting as a navigator, the group can be encouraged to select one child to do a rough drawing of the mural, to decide who will be in charge of the painting, and so forth. An all-important selection for this group is the choice of the child who will make the final decision in case of a conflict. This group of children will have to collaborate with respect to what they will draw, and lastly who will do the actual drawing. Today most kindergarten programs do not grade children on their projects, but are merely concerned that all the children participate and that the project is completed. Perhaps, this philosophy should be encouraged in higher elementary grades. Some schools have already taken the initiative by postponing formal grading until the intermediate grades. Unfortunately many schools are still unwilling to adopt more innovative means of assessment than formal grading.

In first grade, reading, writing, addition, and subtraction are taught in most schools. At this level, children can be reading together in groups, then interpret the material and act out some book report. The mini-play requires teamwork and collaborative learning. By second grade, the

skills needed for the new millennium can be encouraged by way of book reports written by groups of children. Who will do the writing of each part? Who will do the editing? Who will do the illustrating? Who will make the determination if and when there is a conflict?

In third-grade, in addition to the linguistic projects promoting the new skills, students can begin to work in teams while solving math problems. Multiplication and division are introduced in a typical third grade curriculum. Reinforcement of these rudimentary skills is achieved by using word problems. Often, more than one child working on a problem solution will have greater positive effect than just reinforcing the skills necessary for the future. The child with a proclivity toward the subject matter will help the child who cannot do the mathematical analysis as readily. The latter child will benefit in the obvious manner, and the former child will be reinforcing his knowledge. Also of importance is that much to one's dismay, by third grade already, many teachers are not comfortable teaching the mathematical reasoning skills necessary for problem solving. This low comfort level leads to a rote lesson on the part of the teacher, and the dissuasion of queries on the part of the students. Children, working in groups, might be able to decrease the potential damage done by the incompetence of the instructor. An anecdotal illustration of this is the story of the third-grade teacher who was told by her student that a word problem, which she had assigned, had insufficient information to obtain a solution. The teacher responded that for high school or college, perhaps there was not enough information but it was only third grade and for third grade there was enough information given in the problem! We need to ameliorate this potential damage. Mathematics and problem solving are essential for the future success of young children.

Why do we not teach algebra beginning in fifth grade? Conceptually, algebra is fairly simple. The younger minds will be more willing to learn the math concepts that their older counterparts who claim that math is difficult. (Was it their third or fourth grade teacher, perhaps who projected the "level of difficulty" by not answering questions?!) Algebra is a great tool for problem solving. Algebra is a great way to develop algorithmic thought. Based on the national mathematics scores on standardized tests today, we are not succeeding by delaying the instruction of algebra until ninth grade!

Each successive year of elementary school should contain projects incorporated into the standard curriculum. Some of these projects must be group projects, from the usual annual science fair to the social studies to the sets of mathematics problems. Throughout these grades, in addition to the aforementioned, students should be given adequate opportunity to reflect on how a group's interaction might have been smoother, that is, team-building skills.

Research skills must be further developed and enhanced over what is included in today's curriculum. An area that does not receive adequate attention today and that will be of even greater relevance later on, is that of writing. Taking notes and summarizing information can be taught and then practiced until mastered by all students.

THE TRANSITION GENERATION

We are aware of how to alter the traditional educational curriculum of today's student to help them gain the necessary skills for the learning environment of the 21st century. What about those in the transition generation – the ones who will begin college or graduate school at the beginning of the new millennium? What will the change in the educational environment mean to them?

Among other things, they will feel as if they are caught in a quandary. On the one hand, CLN-based distance learning will greatly facilitate their lives. On the other hand, they will have had minimal training in the skills necessary to learn in a CLN environment. They will be accustomed to having had a teacher following their every academic move. They will need to incorporate self-motivation into their learning style. Support will need to be provided to help develop the skills necessary to facilitate learning in the new environment.

CONCLUSION

The new millennium will afford us an opportunity for tremendous expansion in our traditional view of education. We must not merely pay lip service to the vision; we must implement the vision and align it with the changes that will occur in our society. The mode and environment of learning that we have been dealing with heretofore will not disappear entirely. It will, however, be surpassed in functionality. ■

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Note

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