# Accelerated Learning Techniques for Adults--- An Instructional Design Concept for the Next Decade

**by**

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## Abstract

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This paper focuses on accelerated learning for the adult student as a process and a specific model of techniques. The model focuses on the "whole" student including the emotional and intellect aspects of learning. Specific techniques are illustrated to incorporate a variety of accelerated teaching methods used to stimulate sight, sound, and hands-on learning.

Preparation and delivery methods focus on use of association with the whole brain learning process. Traditional note taking is contracted with the new method of mind maps. Music for accelerated learning is illustrated. The pygmillian effect is incorporated with team work which is the most important new skill. Guided imagery as a instructional method is presented to combine words and images in the learning process.

# ACCELERATED LEARNING TECHNIQUES FOR ADULTS --- An Instructional Design Concept for the Next Decade

As educators we are continuously faced with the dilemma: how to reduce instructional time and provide more learning and better learning experiences for our students.

The answer to this challenge comes from applying the principles and techniques of accelerated learning in our instructional methodology. Accelerated learning techniques can cut training time virtually in half while measurably improving learning and job performance for our students.

The adult student working full-time, raising a family, and attending classes many times is physically tired and mentally drained. For students to learn and keep interest during an extended class which may be 4 and 5 hours long, the learning model should incorporate new techniques other than the traditional lecture methods. By using the many new theories and instructional techniques in the field of accelerating learning and brain/mind research, marketing educators can begin to communicate more effectively to adult students and increase their potential genius.

This article considers accelerated learning as a process and philosophy of learning. The discussion presents an accelerated learning model, principles of the method, and techniques for preparation, delivery and practice of techniques.

Definitions of Accelerate

1. to bring about at an earlier point in time
2. to add to the speed of
3. to hasten the ordinary progress or development
4. to enable a student to learn more in less time

## Accelerated Learning Defined

> *Accelerated learning is a method of instruction that provides an atmosphere where students are able to absorb and retain concepts by overcoming traditional barriers of learning* (McKeon, p.64).

The accelerated technique stems from the belief that traditional methods are not always effective.

> *The approach was introduced by Bulgarian psychiatrist Georgi Lozanov who called it 'suggestopedia' or 'suggestology.' First applied to the learning of a foreign language, accelerated learning focuses on the role of the subconscious in the acquisition of knowledge. Lozanov demonstrated that 'superliminal' instruction can stimulate the brain's right hemisphere, thus significantly increasing learning efficiency and improving information retention. This approach has been modified over time and has found numerous applications beyond language learning. Today, it is a multi method, multimedia learning technique that*

> *combines instructional games, highly physical learner involvement, metaphorical activities and background music* (Zemke, p.93).

Accelerated learning is a process of fine tuning the traditional instructor with application of instructional delivery technologies. The natural mind is designed for accelerated learning.

## Benefits

When applied in a concentrated format, accelerated learning techniques can reduce traditional classroom time by more than 50 percent. The time and resources gained with accelerated learning can be reinvested in the design and delivery of additional material. In addition, the accelerated learning technique also works with individualized instruction. The author created a Peak Performance Academic Counseling Service for improving learning for students. During a 5-year period, almost every client reached new levels of learning mastery and achieved top performance in test scores spending less time. Accelerated learning is a multidimensional approach where learners are in direct control of what they are learning.

The benefits include increased learning in less time, with less effort, and with a more enjoyable experience than the traditional learning model.

## Philosophy

As a member of the National Accelerated Learning Network we believe:

> Learning should be fun; it should never be boring, threatening or judgmental. Also, learning should be global. This means the instruction should engage the whole student on all levels: intellectually, emotionally, kinesthetically, consciously, and sub-consciously (Center for Accelerated Learning).

The challenge is to understand the new student learner and apply a new learning environment. The traditional learning method cannot do enough for information age students. An instructor must move from pedagogy to androgogy to wholegogy. Learning how to learn is today's top priority, a shift from linear methodology to geodesic thinking.

> *But now we're into something else: the geodesic age. It's an age that takes as its symbol the geodesic sphere - an interlocking network that suggests integration, interrelationship and a sense of the whole. Now our belief systems, our ideas about human personality, our organization development activities, our scientific endeavors and our educational philosophies are beginning to reflect this new interconnected model* (Meier, p.40).

A comparison of the traditional and accelerated method follows.

| **TRADITIONAL LEARNING tends to:** | **ACCELERATED LEARNING tends to:** |
|---|---|
| emphasize separateness | emphasize wholeness |
| confuse uniformity with unity | welcome diversity |
| trivialize the individual | exalt the individual |
| dull the creative | nurture creativity |
| be EITHER/OR | be BOTH/AND |
| emphasize ONE BEST WAY | be purposefully eclectic |
| be competitive | be collaborative |
| restrict | liberate |
| block human energy | release human energy |
| be static & rigid | be dynamic & flexible |
| be linear 7 hierarchical | be geodesic & mutual |
| be single-pathed | be multi-pathed |
| feel unnatural | feel natural |
| be audio/visual | be multi-sensory |
| be hard work | be joyful |
| be a process | be a state of mind |

## THE ACCELERATED LEARNING MODEL

All the individual components below form an interlinking whole. Each component affect each other and the whole. With all components working together, the whole becomes significantly more than the sum of its parts.

| PREPARATION | PRESENTATION | PRACTICE |
|---|---|---|
| GOALS:<br>High, Specific, Clear, and Meaningful. Help learner clarify goals. Connect these goals with the goals of the course, the organization, and the learner's total life.<br><br>SET:<br>Set the minds of your learners for high achievement and a happy learning experience.<br><br>SETTING:<br>A comfortable, pleasant environment rich in positive feelings.<br><br>TEACHER'S MENTAL PREPARATION:<br>Subject matter competence.<br>Creativity & Imagination.<br>Genuine care for the learners.<br><br>POSITIVE SUGGESTION:<br>Verbal and non-verbal.<br>Pervades all components.<br><br>MIND/BODY RELAXATION:<br>Creates openness and fosters whole-brain learning. | PREVIEW:<br>Synthesis, global overview, key words, key concept, the whole before the parts.<br><br>PRESENTATION:<br>Attractive materials.<br>Action, emotion, drama.<br>Humor and playfulness.<br>High participation.<br>Geodesic & multi-pathed.<br>An adult Sesame Street.<br>Colorful & imaginative.<br><br>COLLABORATION:<br>Cooperation & teamwork.<br>Everyone a teacher and a learner simultaneously.<br>All for one & one for all.<br>Team-based teaching/learning.<br>Non-competitive mutuality.<br><br>REVIEW:<br>Synthesis, repetition, clarification (where needed), expansion, seeing connections. | HANDS-ON PRACTICE:<br>Individual and team-based.<br>Geodesic & multi-pathed.<br>Integrative.<br>Playful, yet practical.<br><br>APPLICATION BUILDING:<br>Immediate usefulness.<br>Individual or team-based.<br>Practical payoffs.<br><br>ELABORATION:<br>Problem solving.<br>Student presentations.<br>Student teaching.<br>Manual skills practice.<br><br>POST-CLASS FOLLOW-UP:<br>User groups & newsletters.<br>Post-class update meetings.<br>Personal visits.<br>Students teaching. |

Source: The Center for Accelerated Learning

## Accelerated Learning Principles

Environment for Learning

1. Create a classroom setting that is colorful, comfortable, and naturally stimulating.

2. Create an environment to get the fun (and success) back into learning rather than the seriousness.

3. Create an environment which helps students eliminate or reduce any fears, stress, or learning barriers they might have.

4. Create an environment which is collaborative and mutually supportive rather than driven by traditional parent-child assumptions about instruction.

*The first step is to get the student to forget to look out the window.*

Our students deserve the best possible learning environment. Every student likes a learning area like a living-room that is roomy, that has attractive soft colors, plenty of lighting on a dimmer switch, a comfortable chair, and a temperature that does not exceed 68 degrees. This type of environment is necessary in order to maximize learning. Now include a stereo, flowers, plenty of colored pens, flipcharts, 3M pads, and food. This environment stimulates the student's mind and contributes to maximum learning. Learning is greatly strengthened by creating an appropriate environment to maximize the mind of the student.

Room arrangement directly affects the ability of students to learn. The circle or U shaped, is designed for interaction of students. The lecture design (Prussian model) or parent/child model where all students face the instructor is not appropriate for the accelerated student learner.

## Preparation for Accelerating Learning

All genius learning is active not passive, and it uses both sides of the brain. Many creative techniques can be used in a variety of ways for presenting traditional course material.

The following includes some ideas for accommodating students various styles of learning and interests to master, manipulate, and enjoy bodies of knowledge.

Acrostics
Brainstorming
Buzz groups
Case histories
Chalkboards/whiteboards with color
Charts
Data show presentation
Debate
Demonstration
Discussion-student lead
Field trips
Films/video
Flannelgraph
Games/crossword puzzles
Imagery
Interview in class or field
Internet presentation
Maps
Memorization games
Mind-Mapping
Mnemonic systems
Models
News articles
Networking Party
Objects/Objects lessons
Overhead transparencies in color
Panels of students or executives
Picture studies
Problem solving
Project teams
Quiz
Question & answer session
Reports
Review in game format
Role-playing
Skits
Song simulations
Storytelling
Symposiums & Forums
TV presentation
Visualizations

## Adults enjoy a lot of variety in the classroom

Instructors must use a variety of teaching styles because adults learn in a variety of ways. Many adult students have not discovered they have a personal style of learning that can be used to motivate and accelerate, their learning process. Once students know their best learning style they can take advantage of this strength in the learning process.

In an ideal learning environment, the pace and teaching style should change every 20 minutes. Adults learn best when they are active, so they should have input and decisions about what, where, when, how, and why to learn. If everything a student really wants to do is forbidden or unavailable, boredom will permeate the classroom.

## Delivery of Dynamic Presentations

1. Develop a learner-centered approach rather than teacher-centered approach.

2. Create a presentation which provides a multi-pathed and multi-dimensional approach to learning.

3. Develop a presentation with a variety of different learning styles, speeds, and needs, rather than force students to produce in an assembly line at a uniform speed rate

4. Implement a variety of presentation techniques to present material pictorially as well as verbally.

5. Incorporate mental imagery to significantly improve knowledge and skill of acquisition learning.

6. Use the power of positive suggestion for a positive and accepting presentation.

7. Organize an environment to promote student group learning in teams of two, three, and more.

8. Implement an environment that provides students with plenty of time for learner articulation.

## Use Association with the Whole Brain in the Learning Process

As educators we know the need to express new ideas in terms of what the student already knows. This technique is known as association. By knowing the differences between the right-brain mode (creative) and the left-brain mode (logical), we can effectively communicate to both sides of the student's brain. Psychologists have proved to us that half the people in America are left-brained, influenced by logical, sequential reasoning. The other half are right-brained, influenced by emotional, aesthetic appeals. The real figures are 45 percent left-brained, 45 percent right-brained, and 10 percent have a balanced-brained. Since most instructional methods focus on left-brain activities, they miss the mark with the majority of right brain students.

The human brain thinks about four times as fast as the tongue can speak. That huge

gap provides the time for distracting thoughts - for mind wandering (Lorayne, 1994 p.29). The way to avoid the mind wandering is to fill in that time gap with left- and right-brain learning activities. In accelerated learning this technique brings items or sequences together in an imaginary way. The imagination of the student associates the words to be learned with a descriptive story which can be easily recalled using both reasoning (left brain) and an emotional approach (right brain).

> *In order for you to remember any new thing, it must be associated with something you already know or remember* (Lorayne, 1990 p.12).

An association example should be extreme or humorous so it can implant the idea firmly in the mind of the student. Every new fact or concept you learn adds to and links up with the existing network (Rose p. 59). Association works best when the imaginary story involves an emotional and reasoning appeal.

## Traditional Notetaking

The subject of notetaking is seldom studied or explained in the classroom. Most notetaking is a system to forget what was learned rather than to remember. We do not remember key sentences.

The purpose of taking notes is more than simple storage of material for recall. It helps the student encode the information, organize the material, develop associations and interpretations, and bring attention to what is important.

When we learned how to speak, we matched key words first. We also use this process when we learn a foreign language. A study by Michael Howe at Exeter University examined students' notes to determine the ratio of key words to non-key words present in the notes; the higher the ratio the better was the recall (Howe). Items that were noted were six times as likely to be remembered as items that were not written down.

## Mind Maps

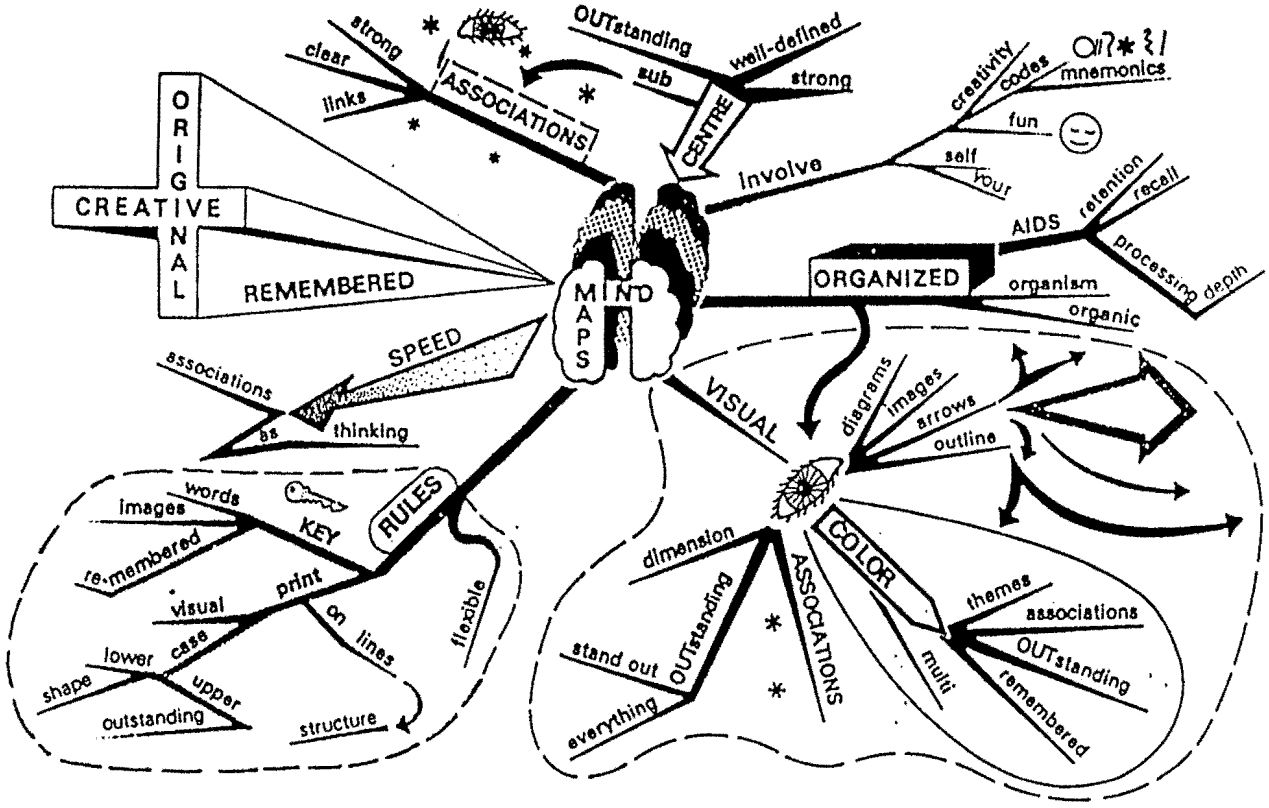
Mind maps encourage note taking in visual patterns rather than a linear form for recall. This new tool for adult notetaking facilitates memory by using visual associations and diagrams of key words.

Since visual images are easier to recall than words, the more pictures drawn the better is the recall. Colored pens are used to stimulate the brain. A mind map works in the same way the brain works. Once the mind map is constructed the concept has a greater impact on the memory of the brain. Symbols speak louder than words.

Organization of notes begins by structure of a tree line for main concepts and branches follow for subheading of key words. Key words are used because the brain drops the non-essentials. Association recalls words and ideas that work together. The center of the page has a strong visual image with a pattern drawn with associated items connected with it. A mind map may have

several subclusters radiating from it or subcenters. The best review for a class is doing a mind map. Mind maps can be used with any lecture, meeting report, or study task (Figure 1).

Figure 1




Russell, Peter (1984). *The Brain Book.* New York: E.P. Dutton, p. 181.

## Music for Accelerated Learning

Humans are rhythmic beings. Sounds and rhythms can motivate and directly effect learning. According to the French researcher Mme. Belanger, playing Mozart "coordinates breathing, cardiovascular rhythm, and brainwave rhythm and leads to positive effects on health. It acts on the subconscious, stimulating receptivity and perception." Synchronized music and rhythm is one of the basic secrets of accelerated learning. The music when paced at 60 beats per minute is perceived by a person as being slower than it actually is. As a result of this retarded time perception, a large number of mental and creative activities can be accomplished in very little clock time, because time itself actually seems to expand.

The following types of music can enhance particular activities:

### CONTEMPORARY MUSIC (for imagery & reflection)

Comfort Zone or Spectrum Suite by Steven Halpern. Sound Health Research Institute. PO Box 1551, San Anselmo, CA 94960.

Gregorian Chant - Salesmen

Natural Light. Steven Halpern & Dallas Smith. Sound Health Research Institute. PO Box 2644, San Anselmo, CA 94979-2644.

You Are the Ocean. Schawkie Roth. ISEN 0-031245-01-X. Vital Body Marketing Co., 42 Orchard St., Manhasset, NY 11030.

### BAROQUE MUSIC (for a sense of well-being, learning and relaxed receptivity)

Adagio in G Minor for Strings & Organ - Albinoni, Tomeso

Beethoven's Emperor Concerto for Piano. Greatest Hits of 1720. Columbia Masterworks MX 34544.

Brahm's Violin Concerto in D Major. Greatest Hits of 1720. Columbia Masterworks MX 34544.

Brandenberg Concertos - Bach

The Pachelbel Cannon and Other Baroque Favorites. Toronto Chamber Orchestra. MMG Records, D-MMG 112.

Handel Organ Concertos.

George Malcolm with the Orchestra of St. Martin in the Fields. Argo Records, ZRG 888. The Rage of 1710. Vox Turnabout, TV 34713.

Tchaikowsky's Piano Concerto in B flat Minor.

Water Music Suite and Royal Fireworks Suite - Handel.

CONTEMPORARY MUSIC FOR RELAXATION & ENERGIZING

Down to the Moon - Andreas Vollensveider, CBS FMT 42255.
Excerpts from Fresh Aire IV & V.
Journeys by David Arkenstone. Ellipse Production. Salt Lake City, UT 84101.
Mountain Dance. Dave Grusin. Arista Records.
Soundtrack from Flashdance
Various Records by Dave Beniot: Can You Imagine, Stages, Freedom at Midnight.
Windham Hill Sampler. Windham Hill Records, WH-1048.
Wishful Thinking. Earl Klugh. Capital ST-12323.

Fast and traditional jazz music will also work well.

## The Pygmillian Effect - The Self-fulfilling Prophesy

Considerable research proves that the human mind does only what it thinks it can do. The expectation of the learner suggested by the instructor is a powerful accelerated learning tool. If the student believes the class is ordinary or easy to accomplish, the student fulfills that expectation. Everything must be stated in a positive and challenging manner in order for students to reach new levels of expectation. Positive statements are essential to believe in to achieve the higher levels of learning.

For accelerated learning to happen students must be prepared for unusual and different approaches at the start of the course. They must know this will be a new and enjoyable experience. Trust and confidence building between the student and the instructor are essential ingredients. Some students may be cynical no matter what the instructional technique may be. The instructor must explain each exercise and encourage questions. Allowing the students to discuss their doubts is part of the technique. Their agreement to go forward is important in developing new approaches to accelerate learning.

## Teamwork - The Most Important New Skill

One of our most neglected resources for adult learning is other people. Most schooling is individualistic but not individualized. We were conditioned to learn alone with collaboration usually considered as "cheating." Making the best use of other people is an essential part of accelerated learning.

A study by David Michaelson & Association found that more than 90 percent of American workers have some exposure to working in a team. Those workers spend an average of 61.5 percent of their work time in a team environment. However, only 50 percent of these workers say they've had any formal training on how to work in a team. Working effectively on teams is the most important new skill MBA's should have,

according to the CEOs polled in Fortune's recent survey (O'Reilly, p. 40).

The emergence of the knowledge-based economy requires managers to learn how to act as 'coaches'.

> *They are supposed to provide resources, eradicate obstacles and protect the well-being of work teams to enable them to learn, solve problems and improve their effectiveness (Olalla, p.16).*

The learning area must be designed for student teams to work together in groups. Group learning activities should be part of the learning design for every class.

## Guided Imagery Techniques

The instructional method must help students learn to combine words and images to create a positive mental climate for accelerated growth and development. The ability of the human mind to visualize things real and imagined is a tool which will help retain learning. The learning objective is to transfer short- term memories into long-term habits through practice and application.

Many of the mnemonics (memory aids) use a form of guided imagery. Using this technique to create humorous and almost wild images provides a change of pace in instruction. This change provides a direct association to new information which will accelerate the learning process.

The students' imagination can be used to allow the student to experience things not possible in the typical traditional classroom. The student has had the experience of being guided by their instructor and now can go anywhere and observe almost anything under any condition using interactive imagery. The concept is to present a visual simulation without actually doing it.

Some Uses of Imagery Include:

Learning a Process
Rehearsing an Event
Practicing a Skill
Defining Problems
Solving Problems
Clarifying Values
Establishing Goals
Changing Attitudes

Many studies have shown that the internal abilities of the human mind are infinite. Students need to discover their own awareness of the subject from within their minds (Aristotle).

A study investigated the importance of vividness in imagery and found when the images were vague and indistinct, recall was around 70 percent. This is much higher than learning gained by rote repetition. When the examples were "seen" vividly and distinctly, as if they were real, recall was around 95 percent (Gregg, p.67).

The human brain cannot distinguish between what is real and what may be imagined. Athletes have used mental rehearsal techniques to prepare for physical competition without physical practice with incredible results. Mental rehearsal will increase learning in the classroom.

## Conclusion

We are just beginning to learn what the infinite power of the mind can do. When we add a proper environment with a large variety of techniques we find learning is a fun and an enjoyable experience.

Accelerated learning has a focus on the "Whole" student being involved in the learning process. This approach challenges the instructor to involve all the parts of the human being known as the "student." The focus includes the conscious, subconscious, logical, emotional, verbal and pictorial aspects available to us as instructors. We can help the student learn more material faster and more completely. We know the power of using sounds, sight, taste, smell, and feelings to stimulate a response. By using these senses to stimulate the emotions of the learner the student will learn faster, use less effort, and have more fun in the process.

One of the most powerful learning accelerators is the awareness that students discover the learning themselves. Using a variety of exercises and techniques which allow for self-discovery will motivate the student to want more.

Accelerated learning as a methodology and technique will help stimulate the imagination of the student to discovering new truths. The method can invest new approaches to learn the same old subjects, so the instructor will enjoy teaching more with a greater return on time and energy.

The benefits include more response among all students and not just another boring class. The student will know the instructor really cares about the "whole person." These techniques help reduce instructor stress and burnout which can happen to any instructor. Our challenge as instructors is to help the student learn more faster, easier, with greater retention. Accelerated learning is the method, and it is fun for both the instructor and student. We can help our students become world class experts and gurus in our field if we are willing to change our thinking on how our students learn.

Will Rogers once stated "Even if you're on the right track, you'll get run over if you just sit there." The time for accelerated learning techniques in the classroom is now and in the next decade.

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# *EDUCATION TAILOR-MADE FOR THE TIMES*

**by**

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# Education Tailor-Made for the Times

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## Abstract

The computer in the classroom and computing in the curriculum are the impetus for major changes in higher education during the next decade. The changes needed in the curriculum and in the concepts and practices of instructional delivery, though accepted by most, will be considered radical and unorthodox by some and academic heresy by others.

Prescribing a certain amount of contact time between the teacher and the learner as a requirement for the award of a corresponding number of academic credits will be reconsidered and redefined. There is no longer a need for this artificial barrier to educational advancement.

The textbook will no longer be viewed as 'the' source of knowledge on some certain subjects and going through the text from cover to cover at a certain pace will no longer be considered the only logical sequence for acquiring the requisite knowledge.

Emerging concepts and complex subjects, along with multidimensional processes and systems, will be presented in forms which will achieve the greatest measure of clarity and understanding. Some of the needed forms do not currently exist. The major purpose of computing is going to be to provide insight through visualization.

The instructor is going to need new skills. The traditional subject matter expert is going to be inadequate. The teacher is going to facilitate the students' link to the deluge of words and images of every imaginable kind from literally around the world and do it all hours of the day and night. The teacher who thinks he or she is in the business of fifty-minute lectures will still be in that business ten years from now.

# Education Tailor-Made for the Times

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## Introduction

When considering a list of the largest companies in America at the turn of the 20th century, one can see that ten of the largest twelve were natural resource companies. Our economy was a natural resource economy. Wherever the most highly needed resources were found, job opportunities followed (Thurow, 1996).

To examine the equivalent list as we approach the turn of the next century, one would now see that the leaders are microelectronic biotech, telecommunications, aircraft manufacturing, and computer hardware and software. All of them are brainpower industries that can be located anywhere on the face of he earth. Where they will actually locate and flourish depends on who organizes the brainpower to capture them. Who it is that will organize the brainpower most effectively and efficiently depends on who it is that educates best toward that objective.

A clear majority of the radical innovations (inventions) of the last two decades have been by Americans , yet when it comes to sales, employment, and profits, all of these inventions have become Japanese products. The Japanese did not invent any of them. Radical innovation, if the innovator is not also the low-cost, quality producer, gives the inventor very little economic and/or competitive advantage. Of course, being the low-cost producer is partly a matter of wages. To a much greater extent, it is a matter of having the skills to do things better--to make incremental innovation.

The global economy is a dynamic economy. It is always in transition. What is not changing is being passed by. The organizations that are, and will continue to do best are those able to move from process to process and service to service within technological families so quickly that they can always keep up with, and ahead of each new generation of technology.

If an organization wants to attain and stay at the leading edge of technology, it must be a participant and partner in the evolutionary progress of 'brainpower'. Knowledge has clearly become the only source of strategic sustainable competitive advantages. The rates of return for industries that invest in skills and knowledge are more than twice that of industries that concentrate on plant and equipment (Thurow, 1996). Industries' skills-and-knowledge investment will be made when and where they have been satisfied they will get the best return. If firms are to locate their top-skill, top-wage jobs in the United States, it will be because the US offers them the lowest-cost, highest-quality opportunity to develop those skills and knowledge. If America's educational system is not competitive in this environment, the market will simply move on.

The skills and knowledge required in the global economy of the next century will be radically different from those required in the past. The people who do acquire those skills and knowledge may or may not be the young and/or the unskilled workers who currently live in this country. Equal to the ability to make anything any where in the world and to sell it anywhere else in the world, is going to become the ability to teach skills and knowledge to anyone, anywhere, and at anytime. Investment will be made in the process that provides the world-class graduate. Educational defects of the graduate are not the problem of industry. They will simply go with the process that gives them a graduate with the necessary market skills. The American worker will have no advantage at the turn of the century if it is not in the skills and knowledge needed to create radical and incremental innovations. If these are not provided by the educational institutions of this country, multinational companies will find them wherever it is in the world that best suits their economic needs.

Instruction and instructional technology need to create and organize the 'brainpower' necessary to make us masters of new production and distribution technologies, radical and incremental innovation, and the strategic consequences of both. This is not going to happen by teaching the same things we have been. There are answers. We need to give them the appropriate priority.

Nothing has so revolutionized the way we do things, the very 'academic way of life', more than the development of computers. Educational institutions, administrative functions aside, have been slow to use computers, computing, and the associate emerging technologies to their fullest advantage. Now that they are realizing the necessity of doing so, these academic institutions must make a serious attempt to 'catch up' with advancing technology.

This is going to require the development of a new attitude throughout academia. A critical ingredient of this new attitude is an openness to, and the acceptance of change. There are changes needed in the curriculum and in the concepts and practices of instructional delivery. These changes, though accepted by many, will be considered radical and unorthodox by some, and academic heresy by others. Nonetheless, what might prove to be an uphill battle will have to be fought. And, it will be won by those who are committed to that vision of where it is that higher education needs to be in the decade. The teacher who thinks he or she is in the business of fifty-minute lectures will still be in that business ten years from now (Walker, 1996).

**Contact Time**

One of the most firmly entrenched practices in today's higher education environment is that of directly equating a definitive amount of contact time between faculty and students with the specific number of academic credits (semester or quarter hours) to be awarded for a given course. This is, in essence, the 'Carnegie Unit'.

When the Commission on Higher Education recommended the universal

adoption of this system, the intended purpose was to standardize requirements for the award of academic credit (Nagel, et al, 1992). Standardization, it was felt, was needed. At issue is the appropriateness of the particular response. It was argued decades ago; it is argued now; and I will argue against its appropriateness for the next decade.

Academic terms of specified lengths facilitate the administration of students, faculty, and learning resource support, but do they support teaching and learning outcomes? Is there even a meaningful relationship between the amount of time spent together by faculty and students and teaching/learning outcomes? The faculty member who thinks there is might be flattering him or herself. Common knowledge suggests there is some relationship between the direction and focus provided by faculty and the student outcomes. However, there is a statistically significant relationship between student effort and measured outcomes that is independent of faculty/student contact time (Nagel, et al, 1992). Isn't student competency what it is about? Dare I suggest that is the total of what it is about.

One 'change' just starting to take place but that will gain noticeable momentum during the next decade is the 'downsizing' of direct contact time and the resurgence of competency-based instruction. All the pedagogical jargon aside, competency-based instruction is not much more than a high-sounding collection of words that simply means a flexible, individualized program that frees both the professor and the student to work at their own pace and to do so without the fear of failure (Nagel, et al, 1992). Making use of specified performance objectives, or student outcomes, it is possible to take a text, a series of books, and a local or national curriculum and develop a program of instructional objectives that will meet the needs and desires of both the teacher and the students--each <u>one</u> of the students.

Competency-based instruction (CBI) is not new. Developments of the next decade will, no doubt, pave the way for the computer to become the tool that proves CBI to be both effective and efficient. It will make its use practical for both the academician and the administrator. Competency-based instruction and computer-based instruction will become synonymous or, at the very least, interchangeable.

The administrative staff at the university of the next decade is going to have to accept replacing this time constraint that academia is tied to by nothing other than tradition and standardization. The only way an academic institution is going to be able to establish/enhance its reputation as a cutting edge provider of technology education is to use those very technologies that are part of the curriculum and put them into practice in the administrative offices. Being able to process applications, registrations, and evaluations at a rate commensurate with the individual learning pace is the only acceptable response. The staff's need for specific start and stop dates as an administrative convenience will be replaced by the students' need to advance in their studies as their abilities allow. There is no need for artificial pedagogical or administrative barriers to educational advancement (Suchan, et al, 1995).

## LEARNING-RESOURCE BASED INSTRUCTION

In the middle of the fifteenth century Gutenberg changed the course of educational history. With the invention of movable type he made it possible to print books accurately, efficiently, and automatically (Aukstakalnis, et al, 1996). Within 25 years, books that were once only available to nobility and the clergy could be had by anyone able to pay, or trade, for them. 'How to' books soon overshadowed the esoteric tomes and religious texts that once dominated the market. For the first time, skills and information were transmitted, on an ever-increasing scale, without personal contact, revolutionizing the spread of knowledge (Aukstakalnis, et al, 1996).

As educators, it is important to remember that the potential of Gutenberg's technology, his invention, was only unleashed because of a shift in what students were taught. It was once considered sufficient for students to be apprenticed and learn a skill. Gutenberg's innovation made teachers realize students would not be considered educated unless they were able to read.

Like those teachers, today it is imperative we provide our students with the tools they need to use the learning resources currently available to them. It is interesting to note how it is that introductory computer classes have not changed but it is even more interesting to note how they have changed. The computer hardware is indeed different but the basic cycle of input, process, output, and storage remains the same. The dramatic change is, and will continue to be, in how we have de-emphasized how the machine works and how we are significantly increasing the emphasis on what it does. We have already seen the shift in focus from the programming techniques classes of the late '70's to classes on the use of productivity tools of the late 80's (Thomas, 1996).

Education is a dynamic field. Our definition of computer literacy, what it really is to know how to use a computer, must be constantly updated to fit a rapidly changing world. During the next ten years, the single, most widely used function of the computer will be as an entrance to the rest of the world, the World Wide Web. Like Gutenberg's printing press, the World Wide Web is a revolutionary advance in the transmission of knowledge. It allows access to learning resources on a scale never before dreamt of. This is evident in the large and quickly growing number of organizations and individuals who indicate 'more information can be obtained at www.something'.

Just as teachers acknowledged centuries ago the importance of reading to education, we must accept and pass on to our students that knowing how to access and use 'the web' is an essential component of computer literacy. Beyond this point, the ability to use 'web browser' software will be considered as much a part of literacy as knowing how to read a library card catalogue is today (Tennant, 1996).

Through the next decade, 'the web' should go from being an exciting element of an introductory computer course to being 'the source' of information for many courses and as a delivery tool for even more. The degree to which this can and should be done

is open to discussion and debate. By the end of the next decade, it will be decided.

## THE 'LINEAR TYRANNY' OF THE TEXT

Other than those rare instances when it is essential to follow a very specific instructional sequence for an extended period, there will be little evidence at the end of the next decade of the illogical notion that teaching and learning have to follow some predetermined course. Just as there are individualized methods of instruction, there are idiosyncratic paths to optimum learning.

The key to what is going to happen in this area in the next decade is to liberate learning from the 'linear tyranny' of a textbook where each chapter moves lockstep into the next (Herlehy, 1995). The paradigm will be to have access to a 'huge encyclopedic wall full of textbooks' and for the student to be able to go right to the information that is needed and to have it presented in multiple ways, with sound, with video, and with graphics or animation (Herlehy. 1993). The 'on-line' connection to learning-resource materials will change the textbook from being 'the' source of knowledge to being, at the very most, a point of departure for the learning process.

The interactive capability of the 'on-line' connection will easily be upgraded to provide instant feedback to a person's response to instruction. Because students respond independently, they will be given feedback independently.

Taking advantage of instructional technology of the next decade will allow students to zig zag through a course, taking a little bit from one section of a course outline and more from another in a fashion that allows them to customize a course, indeed a program, to accommodate their idiosyncratic learning needs. It will let the student have a cursory view or in-depth knowledge of a subject, depending on what the need is.

## LEARNING THROUGH VISUALIZATION

The greatest challenge that has always faced the educator has been to present unknown theories and foreign concepts to students in ways which would achieve the greatest measure of clarity and understanding. This is going to be even more challenging in the next decade. Subjects and concepts studied will become increasingly complex and multidimensional. Multivariate processes, concurrent design and engineering activities, and biotechnic developments will necessitate a heretofore unheard of degree of multidimensional computer simulation and visualization not only to be economically successful but also to be taught and learned.

Computer simulations and visualization techniques are being used, and will become increasingly sophisticated in their use, in higher education as the tools that best communicate complex subjects and foreign concepts to students in a form which enables greater insight, a clearer understanding, and longer retention.

This process is usually referred to as

'visual thinking' and has foundation in accepted principles of cognitive psychology and visual-information processing. To create an accurate mental picture of some multidimensional concept or complex process, some form of input is needed with which to create a 'vision.' If the input is highly symbolic and/or esoteric, a 'bottleneck' forms (Aukstakalnis, et al, 1996). The information processing path to the brain is blocked because our preconscious must translate any input into some understandable form before it can be used by our conscious mind. It's only when information is presented in a recognizable form that it can be effectively studied and committed to conscious understanding (Aukstakalnis, et al, 1996).

With the development of hardware and software in the last decade and what will occur during the next decade, the ability to graphically represent highly complex processes or multidimensional concepts will dramatically enhance the educational process. A significant improvement in levels of understanding and awareness will be achieved.

Computers will be used in some capacity in almost all educational tracks. The development of the next decade will be visualization techniques. These techniques will expand well beyond the simulations of today into such things as the simulation of three-dimensional scenes on a standard, two-dimensional monitor and onto fully immersive, head-mounted and head-coupled displays (virtual reality) (Aukstakalnis, et al, 1996).

The accurate interpretations of these visual representations will certainly depend on the interaction between teachers and learners. The process of arriving at solutions to visualization problems will be facilitated by the instructor. This will require specialized individuals using specialized hardware and software to achieve satisfying visualization results. The advantage of student involvement in the process is not inconsequential. Using visualization techniques in teaching encourages students to think in three dimensions when approaching a problem. They are not constrained by the visual parameters. They are more inclined to think 'outside the box.' Visualizations that can be created can be recreated again and again with differences in any variables that exist in either space or time (Aukstakalnis, et al, 1996).

Simulations and visualizations are going to create an explosion in creativity. This new range of teaching tools will create truly new ways of looking at the world around us and new ways of thinking and problem solving--transforming the educational process to one of insight through visualization.

**THE DIGITAL PROFESSOR**

The university instructor will need to acquire new skills. The traditional subject-matter specialist is going to be inadequate for the challenge. The called-for expertise will be in resource-based learning (Tennant, 1996). The teacher is going to facilitate the students' link to the deluge of words and images of every imaginable kind from literally around the world and do it all hours of the day and night.

The tools necessary to make a transforming change are already available. We can surmise many things about

technologies of the future and their effect on the teacher. However, if we only have a personal computer and access to the Internet, we have enough to begin revolutionizing higher education. We have the foundation in place for the building of the 'digital professor'.

We can create teaching tools interactive enough to let students seek them out and work with them at their own pace and when it is most convenient for them. The student can use an on-line service to review class sessions in as little as two or three minute segments instead of 50 minute lectures and also review them as many times as they want. It would be difficult to argue that to review in small segments directly from the professor's mouth is not better than attempting to decipher scribbled notes taken one to three-hour lectures (Tennant, 1996).

There are infrequently-taught and low-enrollment courses that are in danger of disappearing altogether. Many institution have no qualified faculty to teach these courses (enrollments do not justify the position) and the department with the qualified faculty cannot give them the time to develop the courses in light of enrollments. If a college or university was willing to allow the initiative, a self-paced interactive instruction, with open discussions, recitations, and exercises could be made available on-line world-wide(there is no obstacle to doing so right now), a highly qualified faculty member could start a student in a program of instruction; monitor his or her progress through it; and do an outcomes assessment upon completion never having been face to face with the student (Finn, et al, 1996). For the 'nattering nabobs of negativism', it is being done right now and on more than a trial basis.

If the 'digital professor' delivers high quality instruction via the electronic network, we will do ourselves a favor by getting more students; we will do our students a favor by re-energizing and re-directing them; and we will have done the professor a needed favor by spreading education farther and deeper.

Technology manifested in the 'digital professor' can be dehumanizing and distancing. Our students are already subjected to huge lectures, novice teaching assistants, itinerant part-time lecturers, and other makeshifts. If and where the ideal exists, we should strengthen it but with all of the information we have on the imperfection of our endeavors we have enough reason to seize the opportunity to use new tools.

The instructor is no longer what he or she was when the university taught all of its students in one location. Each field of study had its 'professor', the supreme local authority. That supremacy has steadily faded, as students increasingly discovered more ways to learn than to sit and listen to the local 'guru'.

The role of the professor in the next decade will not be to provide information on the subject but rather to guide and encourage students as they wade through the deep waters of the information deluge. Instructors will thrive as mentors. They will develop the skills needed to nudge students through the crucial tasks of gathering and processing information: problem solving, analysis, decision making, and synthesis (Finn, et al, 1996).

The professor will be the point of

entry to the world beyond the campus library. He or she will be a kind of 'icon' on the monitor--click on the professor and he or she will take you to, and through, the information world. If this seems absurd remember, in part, it already takes place with the World Wide Web.

We will sacrifice face-to-face intimacy for the sake of giving students the freedom and power to learn. Those who want to stay in the fifty-minute-lecture business will find there will not be nearly as many of them and the lecture halls will be much quieter and far more tranquil--not to say, 'empty'--places (Finn, et al, 1996).

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