

THE IMPLICATIONS OF MULTIMEDIA FOR TRAINING IN THE '90S

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The Implications of Multimedia for Training in the '90's

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Television has had a dramatic impact on the adult population. By the time a person graduates from high school, they have been exposed to over 20,000 hours of television, that is high impact visuals and audio. In contrast, that same person has been exposed to approximately 14,000 hours of classroom instruction. Multimedia brings the impact of television to the training environment.

While motivating adult learners is a very complex issue, part of the solution resides in the application of adult learning principles to multimedia instruction. Documented research shows that when interactive multimedia is employed over every other style, stand up instruction, computer based training (CBT), or video based training, learners prefer interactive multimedia in 97% of the cases. That means almost 33 to 1 prefer interactive multimedia to other training approaches. Preference of learning approach also equates to increased performance and results. Documented studies show that as more senses are incorporated into the learning environment, retention increases dramatically. Traditional computer based training, that is reading a computer screen, is very similar in task to reading a book. Documented research shows that a person remembers only 10% of what is read, 20% of what is heard, 30% of what is seen, 50% of what is seen and heard and 80% of what is experienced. Interactive multimedia simulates experience to such an extent that it has been documented in over thirty research studies to replace the actual experience.

While the issue of individual motivation is complex, multimedia has demonstrated through numerous studies to be a major factor for increased performance, reduced time on task and increased employee productivity. Multimedia programs ensure student motivation and successful program completion. Well-known Adult Learning Principles enhance and complement multimedia in this respect.

Adult Learning Principles

The Adult Learning Principles include the following:

- Project vs. subject centered focus
- Immediate application of learning
- Capitalizing on learner's previous experience
- Learner vs instructor centered focus
- Self-directed vs dependent focus
- Active participation in the learning process
- Whole-part-whole sequence of learning
- Association of material
- Integrated thinking
- Recognition of individual learning rates and styles
- Maximizing time on task
- Regular checking of understanding
- Appropriate and meaningful instructional cues

- Feedback on results with positive reinforcement

The following examples illustrate how these principles can be incorporated into training applications.

Project vs. subject centered focus

Adults are problem oriented, thus training must be problem centered. Classroom training is predominantly subject centered. By focusing on problems, adults are challenged to use their experience in finding solutions to problems.

We have created training programs to teach high school coaches how to accurately diagnose knee injuries; to teach sales representatives for orthopedic implant manufacturers how to enter product orders into the company's computerized order-entry system; and to teach retail store employees how to recognize potential shoplifters. These are just a few examples that illustrate how multimedia learning applications are being used today.

Immediate application of learning

Training programs can allow immediate application to the learner's work environment. In this respect, the programs may be regarded as a modern approach to the older but successful on-the-job-training concept. Whether the training is aimed at teaching product knowledge of caskets or orthopedic implants, the learner can employ the skill and knowledge just acquired to enhance job performance.

Capitalizing on learner's previous experience

By employing pretest and branching techniques, training programs recognize the value of the learner's previous experience. Such programs are designed to permit learners to progress at their own

pace, to focus on material they do not know and to bypass material which is already known.

Learner vs. instructor centered focus

Training programs can be designed to focus on the learner. The learner can select the subject, topics within the subject and pace. By using built-in navigational controls, the learner can move forward or backward, access a glossary or bibliography or review course maps.

Self-directed vs. dependant focus

Learning is self-directed. The learner is not dependent on a group pace, but controls his own pace. We have developed a proprietary menu system which allows the learner to access information quickly and effortlessly.

Active participation in the learning process

Training programs can involve the user. The learner is an active participant in the learning process. Regardless of whether the subject deals with executive, management, sales, industrial or medical training, the learner makes decisions and is branched to different sections of the course based on these decisions.

Whole-part-whole sequence of learning

Programs can relate information into context. The learner is introduced to concepts using whole-part-whole sequencing. The learner's ability to quickly grasp the material is substantially increased by first learning a small concept, then relating that concept to the whole.

Association of material

Learning generally does not exist in isolated settings and frequently the same material can be used for multiple applications. Product knowledge is very much related to both sales and technical training. More often a logical association exists between information and its use in various other parts of an enterprise. This information is a valuable corporate asset. Our programs recognize the investment involved in capturing and maintaining this information by organizing this material modularly. Modularity minimizes the expense of updating information or of extracting this information for use in other applications.

Integrated thinking

Training programs can employ integrated/holistic thinking. Through navigation and mapping, individual learners can determine their current position and assess their progress throughout the course.

Recognition of individual learning rates and styles

Training programs can be designed to recognize that individuals have different learning styles as well as learning rates. Programs offer visual, audio, and conceptual stimulus. Programs are designed to stimulate the learner by rewarding correct answers to exercises and quizzes. By the same token, a benevolent, non-judgmental response is provided in response to incorrect answers.

Maximizing time on task

Studies have shown a 30% to 60% reduction of time on task using interactive multimedia. Learners proceed at their own pace and access information as needed. Learners move forward and backward

through the material in accordance with their personal style and educational needs.

Regular checking of understanding

Our training programs incorporate periodic, regular checks of the learner's comprehension.

Programs can be customized by the training administrator to require 100% mastery, or any other specified level of accomplishment. This can be accomplished by employing remediation techniques that return the learner to material not mastered, feedback on responses to reinforce success, and other appropriate learning strategies.

Appropriate and meaningful instructional cues

Adult learners require appropriate and meaningful instructional cues. Our programs employ icons, images and audio feedback appropriate and sensitive to the audience.

Feedback on results with positive reinforcement

In addition to the audio and visual feedback used to reinforce the learner's understanding of material, learners are remediated into appropriate course material to further enhance the learning experience.

Overall Program Structure

In addition to utilizing the Adult Learning Principles in designing multimedia training applications, there are specific overall design concerns that can effect learner motivation and retention. These include:

- ◆ Skill and Drill: the repetition of an exercise insuring the learner's understanding and proficiency. This is usually followed by a self-test.
- ◆ Tutorial: personalized company assistance promoting understanding of a particular concept; one-on-one is the best and most expedient method.

- Gaming: Know Your Product game, a method of involving competition under specified rules; and,
- Simulation: the method of teaching allowing a learner to manipulate a particular environment.

Multimedia technology uses numerous learning aids imbedded in programs to facilitate learning. These include:

- Icons and buttons to permit the student to navigate through the course. We use forward and backward navigational tools, a looping tool, ability to return to the main menu, help screens and other features as required by the content;
- Course maps that permit the learner to assess where they are in the course;
- Glossary and bibliographies to permit the learner to access definition of terms;
- Remediation programming to loop the learner through material that has not been mastered;
- Randomized question pools for mastery tests;
- Help features that include how the system operates;
- Pretests to assess the learner's current level of understanding and knowledge with branching on results to permit the learner to move quickly through material that they have previously mastered;
- Periodic exercises to verify learner retention;
- Comprehensive post tests to measure performance and mastery;
- Tracking of learner progress through use of a database manager;
- Bookmarking capabilities to permit the learner to leave a program and return at a later time to exactly where they left;

- Course objectives stated at the beginning of the course and at the beginning of each new section;
- A summary screen that lets the learner review material before taking the mastery test.

Additional features are added to courses as required. Each multimedia course can be designed to employ these key concepts while also addressing the specific requirements of the content. In this respect, content can be made easy to understand by incorporating the following features:

- High level of student motivation by using graphics, digital effects, audio and text in appropriate educational strategies;
- Random visual and audio accessibility;
- Consistency of instruction that guarantees all students receive a high quality presentation;
- Dual track, stereo audio with music and professional voice over as required;
- Subject mastery that can be adjusted by the instructor. Mastery levels can be set at 100% if required and can be modified by the instructor as appropriate;
- Feedback and reinforcement using immediate and automatic feedback and reinforcement including visual, graphic and audio;
- Zoom feature to let the learner examine in detail material and concepts;
- Self-paced learning permitting each learner to master the course at their own learning rate; and,
- Round the clock availability allowing the learner to take the material on demand.

Further educational concerns include graphic quality, testing and evaluation, on-the-job applicability and obsolescence issues.

Graphics Characteristics

Multimedia training programs employing AVC use VGA graphics resolution, but with enhanced resolution to 8 bit graphics with 256 colors. The resolution is 320x480 lines of resolution. Picture and image clarity and quality is unmatched. Even though the images are superb, the image size is approximately one tenth of the size of comparable industry standard images. Because of this, the learning process benefits in several significant ways. First, we are able to provide close representation of a company's products on the computer image. Because of the high image quality, the learner does not experience a believability problem. We are also able to provide greater detail that is further exploited to enhance the learning process. Secondly, because we can support stereo audio, the learner has multi-sensory exposure further enhancing the learning environment. The combination of high quality image and low memory requirements means that we can pack our programs with more images and use less memory. We use a five to one ratio, that is five images for one tiff or targa formatted image. More visuals means greater representation of products and enhanced learning.

Student Testing and Evaluation Procedures

Students are tested against the behavioral learning objectives prescribed by the program. We recommend that mastery levels be set at 100%. Because of the inherent capabilities of multimedia, mastery at 100% is still accomplished in less time than with conventional approaches. We employ several testing strategies as previously documented. Student performance is tracked by the system. The instructor has the ability to review student performance and recommend additional strategies to assure success. Testing is accomplished in a variety of approaches. These include:

- Exercises after each section, chapter or major content function;
- Module tests from a randomized pool of questions; and

- Mastery test covering all major course objectives.

Final mastery is compared to initial pretest results to measure overall program effectiveness.

On-the-Job Application of Learning

Multimedia training programs can incorporate not only skill and drill and tutorial strategies, but also game and simulation strategies. Our programs can challenge the learner to apply the principles, skills and concepts that have been learned in realistic situations. This takes the multimedia user where CBT programs could never take them, into the realm of experience. Multimedia with realistic image, voice, noise and sound offer capabilities that no other methodology can approach. The difference between interactive multimedia and computer based training is similar to being in the driver's seat of a race car (interactive multimedia) versus reading about the experience (computer based training). We have known that experience is the best teacher. Now with interactive multimedia, we can afford to put the learner in the driver's seat!

How to Upgrade Proposed Software

Images, audio as well as story files can be upgraded and distributed on a company's current network. When an image or audio file or story is created, updated or modified, it can be automatically loaded onto the distributed system via modem, network software or floppy disk. The file is copied onto the local system. The new file replaces the old one and the user is virtually shielded from the process. There are no expensive charges, no complicated re-editing problems and no reliance on outside production services. Cost for upgrading can be handled on an hourly rate or on an as needed basis.