Why Interactive?

*Before stepping into the development and use of interactive courseware, organizations should understand **why** they need to have an interest in it in the first place...and the reasons may not be what you think.*

This article sheds a little light in that area. It provides interactive research data, insights into why and how interactivity works, and defines the basis for Interactive Communications' unique ISD approach.

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The interactive training industry has long shared something in common with newborn babies—neither one arrived with a set of instructions or an owner's manual. Application developers and parents alike quickly discovered that raising either one to maturity could be difficult.

Over the past 18 years, application developers have nurtured the growth of this new and powerful form of communication. However, the path of this growth is littered with "boo boos." As any good parent knows, we often learn more from our failures than we do from our successes—and in 18 years, we have learned a great deal.

We found we needed to understand more than just the technical capabilities of the interactive hardware. What we really needed to learn was how to use this hardware to interface with the human mind and its emotions. To do this, we had to understand more about human behavior, physiology, psychology, and ethology than ever before.

RESEARCH

After the first ten years of trial and error, interactive developers began to understand how to design for this new technology. Clients finally started to see benefits from their investments. And there grew a renewed interest in testing this technology against traditional forms of training.

About This Article

Why Interactive? *was originally presented to the Automotive Training Managers Council in the fall of 1991. It has since been published in the international trade journal, the* ***Multimedia Monitor****; used in the keynote address for the* ***European Interactive Videodisc Convention*** *in Barcelona, Spain; and provided a foundation for interactive panel discussions at Microsoft Corporation's 1992* ***International Conference and Exposition on Multimedia and CD-ROM*** *held in San Francisco, California.*

In the last ten years, a fair amount of research information has become available. Figure 1 presents a summary of key data from six of these studies. In each case, a given course was produced in both interactive and classroom formats. Content included both soft and hard skills training. In most of these studies, separate developers were chosen for each format. This allowed each version of a course to be produced by developers specializing in that format.

The results are as follows:

- In the area of ***Learning Gains***, the studies found that interactive versions of courseware increased learners' understanding and retention of the content by as much as 56 percent over classroom versions of the same courseware.
- ***Consistency of Learning*** measured how consistent the individual learners' understanding of the content was. Compared to the classroom format, the interactive learners' understanding of this content was 50 to 60 percent more consistent.

Research Highlights*

Interactive Videodisc Versus Live Instruction

Learning Gains	56% Greater
Consistency Of Learning	50-60% Better
Delivery Variance	20-40% Less
Training Compression	38-70% Faster
Learning Curve	60% Faster
Content Retention	25-50% Higher

*Sources: U.S. Army, IBM, Xerox, United Technologies, WICAT, Federal Express

Figure 1.

Note: Not all studies tested for each of the following measurement factors. Terminology for similar measurement factors sometimes varied.

- ***Delivery Variance*** measured how consistently the delivery media (or instructor) presented the content from learner to learner or class to class. Although the different paths individual learners can take through interactive courseware create the potential for variance, these studies found 20 to 40 percent less variance among the interactive learners' understanding of the content.

  It's interesting to note that this reduced variance can spell the difference between success or failure for many organizations on the service side of our industry.

- ***Training Compression*** measured how much faster learners completed their interactive version of a course as compared to the classroom version of it. This means that if a given course took classroom learners ten hours of "seat time" to complete, the interactive learners may have completed it in as little as three hours. This data, showing average training compressions of 38 to 70 percent, is consistent with our experience.

- ***Learning Curve*** is similar to "Training Compression" and measured how quickly learners gained mastery of their course's content. In these studies, the curve for interactive learners was on average 60 percent faster than for their classroom counterparts.

- In our assessment, ***Content Retention*** is the most important factor measured by these studies. It is here that most organizations gain their greatest return on investment. This item measured how much content reached *long-term* memory among the learners. Although all of these studies appeared to test retention in a time frame of about 30 days or less following course completion, their findings of 25 to 50 percent higher retention factors for the interactive format are significant.

Other, less formal tests showed a 24 percent retention level for classroom formats measured after six months, but a 70 percent retention level for learners who took interactive versions of the same courses—even when measured up to 9 months after course completion. These findings correlate well with data from interactive courses we have developed for our clients.

Those familiar with other studies can point to data which actually show *no* improvement for interactive training over traditional classroom formats. From our observations, the difference boils down to the quality of the individual, interactive program developers. Not all are created equal. In almost every case, developers well-known for successful applications generate impressive data when *their* programs are compared with traditional delivery formats.

WHY THE IMPROVEMENT?

There are many reasons for interactive technology's learning improvements—multi-sensory input, learner control over the educational process, one-on-one training support, and other factors. These factors are fairly well known and understood. However, we at Interactive Communications have always felt there was a single element *essential* to the success of any interactive application—an element so important, that if an application didn't possess it, it would be doomed to failure.

It has taken us years to clearly identify this element and master its use. However, it was never hidden. It can be boiled down to the following statement, "Learning is shown as a change in behavior

as a result of experience." This statement can be found in the writings of most major instructional design theorists—almost word for word.

This quote represents a rare note of agreement among learning theorists. It points to the critical importance of *experience* as the primary element which *causes* behavioral change.

It is for this reason that we put so much emphasis on engineering "learning experiences" into our interactive programs. We have found that it is through the learners' *application* of course content, through their *performance* of course objectives, and through their *experiences* gained in real-world simulations, that knowledge enters long-term memory, and human behavior is subsequently changed. *Experience* is the key.

> ***"Learning is shown as a change in behavior as a result of experience."****
>
> *Sources: Knowles, Haggard, Cronbauch, Harris, and Schwahn

Figure 2.

Figure 3 illustrates where the most critical learning improvements occur in interactive courseware. The top of the diagram lists the four basic levels of learning: knowledge, recognition, simulation, and action. The bottom presents a flow diagram from a typical interactive course. The gray shading in between shows approximately where each level of learning is supported.

The first level of learning is ***knowledge.*** Here, learners mentally store information which will later be used in mastering course objectives. In a sense, learners are being "fueled" with information. This information, however, is not necessarily well networked at this time. At this level, students must "take on" a great deal of basic information before the terminal objectives can be met. In interactive courseware, this knowledge level is generally supported during the tutorial presentation of content points and point tests.

The ***recognition*** level involves bringing the learners' newly acquired knowledge to a conscious level and allowing them to manipulate that knowledge. When learners manipulate or reconstruct "knowledge," two important things occur. First, when that knowledge is brought to a conscious level, it becomes broadened and deepened. Second, it becomes more tightly networked with related knowledge. At this level, learners will begin to assimilate the basic knowledge they have acquired during the knowledge learning level. Recognition level learning generally occurs during the practice exercises within individual lessons. Here, learners must remember and manipulate their new knowledge well enough to answer basic test questions.

The ***simulation*** level is where learners "put the pieces together." The knowledge elements have now been manipulated and reconstructed sufficiently to function as a whole. This level is a "modeling" step. Understanding the concepts behind an entire procedure is much different from memorizing only the discrete elements in that procedure. In interactive courseware, this level of learning is supported by simulation-based practice exercises and lesson tests. However, it is not confined here. In some of our courses, simulation-based exercises may replace or augment text-

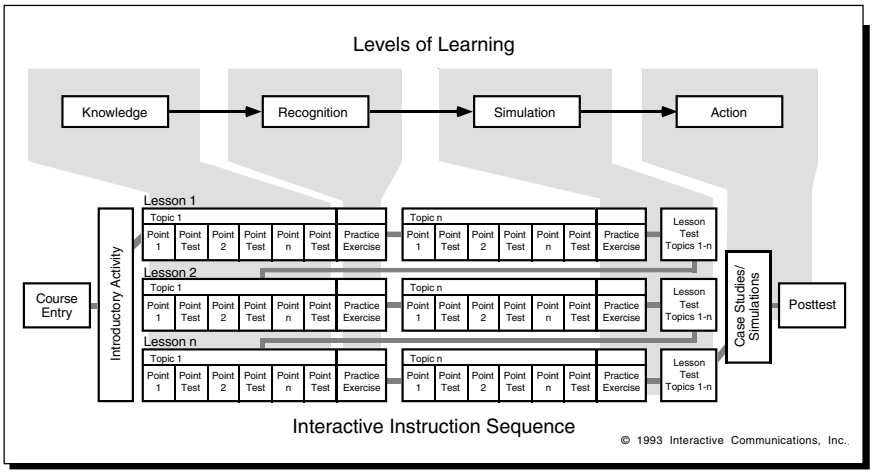

Figure 3.

based testing during point presentation. In other courses, it may not occur until the case studies or simulations. Budget, schedule, audience, and content requirements all play a part in determining the ultimate design of individual courses.

At the ***action*** level, learners use the knowledge they've developed throughout the course to cognitively "perform" what they've learned. Through this *performance*, learners are able to demonstrate the highest level of mastery measurable by any of today's training technologies.

INTERACTIVE GOAL

Our goal with interactive technology is to bring learners into the action level more quickly and effectively than is possible through traditional forms of training.

To illustrate the difference between these two formats, figure 4 shows how far interactive courseware typically takes learners through the levels of learning compared to traditional formats. With the exception of live, hands-on laboratories, even the best traditional formats only bring learners into the simulation level.

As already mentioned, learners must *perform* what they've learned in order to reach the action level. In addition to this, we've also learned that this performance must be in the context of the learner's real-world environment. However, in most cases it is not practical or even possible to simulate these real-world situations in a classroom.

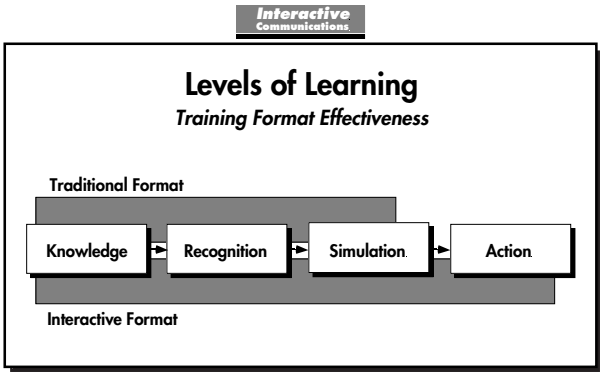

Figure 4.

The interactive format *does* support action level learning by allowing the construction of real-world simulations through the integration of video, graphics, stills, audio, text, and interactions. Simulations can be culturally engineered to test knowledge *and* performance abilities under realistic conditions and circumstances.

SKILL DEVELOPMENT

As training developers, one of our greatest hopes is that what we teach our learners eventually turns into better job performance skills. But, how do we get our learners to make the jump from "performance" to "skill development?" Once again, the key lies in *experience.*

The *primary* reason for action level's long-term benefits is not the *performance* of what an employee learns, it is the *experience* these learners gain *from* that performance. It is this *experience* which allows the development of true job-performance skills. In other words, performing what's been learned creates the experiences which result in skill development. In addition, the sooner this performance occurs after training, the more successful the development of these new skills.

In traditional training formats, opportunities for skill development do not occur until after learners return to the job site and are no longer in a controlled environment. Skill development does not occur if the learners are not required to perform their new knowledge within a relatively short period of time following completion of the course. Those who don't, fail to remember enough of the content to effectively put it to use—and therefore fail to develop the requisite skills.

This points to one of the most important benefits of interactive training. In well-designed interactive courseware, *all* learners must perform *all* objectives *before* completion of the course. In addition, the interactive program's practice exercises, simulations, and case studies require that this performance occur within a controlled training environment.

TAKING ADVANTAGE OF INTERACTIVITY

One of the most important lessons we can offer from our experience in the interactive industry is to not be timid about wading into the technology waters. Yes, there will always be newer, cheaper, more powerful technologies "just around the corner." Yes, the investment costs in applications will always be high. But to reap the benefits of this powerful media, and to earn a sizable return-on-investment, organizations should carefully chart their course and then methodically follow it through.

To avoid many of the "technology traps" other organizations have fallen into, we recommend following these simple steps.

1. Get *experienced* help. Consult with people knowledgeable in the interactive industry to determine if the interactive format is appropriate for your training or communication needs. If it is, have them help determine if you can earn a return on your investment within an acceptable timeframe. Common formulas for this take into account initial hardware and software costs, number of learners per year and per course, average savings from training compression, reduced seat time, improved retention, and many other factors. These formulas have been adjusted over the years to take "reality" into account and can be quite accurate.
2. Review *currently available* technologies and select one that will satisfy the return-on-investment formula.

   Do not be tempted to wait for that next generation technology that's "just around the corner." The currently available CD-i systems mentioned earlier were "just around the corner" for five full years. During that time, one of our clients who looked at CD-i has earned their return-on-investment three times over on an interactive videodisc system that was readily available then.
3. Put it to use! Once a delivery technology has been selected, begin building your applications library by selecting *experienced* developers—those who have *demonstrated* their ability to design and produce effective interactive applications.

   And above all, shop around. All laser discs (and interactive developers' sales literature) look shiny on the surface. Ask about their interactive philosophies and how these are translated into their interactive designs.

   Then, look at their courseware. Is it truly interactive? Beware of what we call "interrupt-a-vision" where the learners' only interactions are to progress from page to page or to answer simple test questions.

   Also, look at the frequency and sophistication of interactive simulations. Remember that it is through these that learners achieve action level learning—and begin to build critical job-performance skills.

It is also important to keep in mind that the use of any new technology is an *evolutionary* process. To put an interactive training program in place, companies must put a stake in the ground and standardize on a fixed set of hardware and software features. If this is done carefully, our experience has shown that the organization will gain more than a simple return on its investment—its employees will learn more, learn it quicker, and remember it longer than they ever did before.

Once that stake is placed though, the interactive industry will continue to advance the state-of-the-art elsewhere. At some point in the future the company will need to reassess its program and determine how best to evolve into the next phase of its life.

THE BOTTON LINE

So, why interactive?

Simple. Because it works.

With properly designed interactive training applications, employees can learn a lot more, learn it more quickly, and remember it longer than through any other form of training.