Distance Learning: Does It Work?

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Over the past decade, budget pressures have forced both the students seeking training as well as those who provide training to find less costly ways to train people. Many students can no longer afford to travel to classes, nor can they afford long periods of time away from the job site. Large central classroom facilities, multiple distributed classrooms, or the cost of flying instructors to the students have now become major budget items for training and education departments. Distance education is seen by many as the solution to these cost problems. The question is: Does it work?

Upon closer examination, the question "Does it work?" becomes much more complex. One must ask: "Does it work in comparison to other alternatives?" It is important to know what criteria is being examined to determine if distance learning is working. The purpose of my paper is to compare distance learning to other delivery formats for training, using a specific set of criteria. This analysis should help answer the question posed.

First, consider the alternate methods of training delivery that are available to today's training providers. Figure 1 gives a list

- **Self-study publications**
- **Lecture courses**
- **Lecture lab courses**
- **Videoconference**
- **Mbone**
- **Videotape**
- **Web-based materials**
- **CBT (TDT)**

Figure 1: Delivery Methods Available

of eight of the most commonly used forms of training. The first three are the traditional mainstays of the industry. The remaining five are the newer delivery methods that are being promoted as effective distance learning methods of the future. Videotape and computer-based training (CBT) methods are well understood because they have been available for many years. It is videoconference (high-speed two way audio and video delivered to the job site via leased lines), Mbone (low-speed one way audio and video delivered to a workstation via a network connection), and web-based material (information provided on a network server and viewed via a browser) that are the newcomers to the training industry. In order to compare these methods of training delivery, a set of criteria or considerations was established to highlight the advantages and disadvantages of each delivery method.

Figure 2 lists seven major considerations that students and providers discuss in regard to training. There may be additional

- **Cost of creation**
- **Cost of distribution**
- **Cost of "attending"**
- **Ability to stay current**
- **Effectiveness**
- **Interaction with instructor**
- **Acceptability to students**

Figure 2: Ranking Methods/Considerations

considerations, but these are the ones chosen for this discussion. The purpose is to rank all of the delivery methods when viewed in the light of each specific consideration listed. This should help us determine if distance learning works, when compared to other forms of training and measured by a specific criteria. The next seven slides provide this ranking.

Figure 3 refers to the costs associated with creating the materials used to deliver the training in question. This includes developer time, equipment costs, review and editing time, materials, and the creation tools (software or hardware) needed to produce a product ready for delivery. Research time is not included in this consideration. Notice that lecture lab courses have a low cost while web, videotape, and CBT are costly. In its simplest form, a lecture lab course could mean putting the product developer in a room with students and letting a

1. Lecture lab courses
2. Lecture courses
3. Videoconference
4. Mbone
5. Self-study publications
6. Web-based materials
7. Videotape
8. CBT (TDT)

Figure 3: Ranked by Cost of Creation

discussion occur. This would have a small or zero development cost yet it could be effective.

On the other hand, it is estimated that one hour of simple web materials takes 60 hours of development time, and one hour of CBT can take up to 200 hours of development time. Videotape development time falls between these two estimates at about 100 hours for each hour of video. Since this cost is often overlooked by those requesting training, web-based products, CBT and videotape are often seen as "easy" ways to convey information. However, at these development cost ratios, the burden falls on the creator of such courses to support the cost or price the product high. Neither solution is acceptable unless demand for the information is VERY high so that costs can be distributed over a large audience.

When comparing "Distribution Costs" in Figure 4, only the cost of getting a final product to the student is included. Notice

1. Web-based materials
2. Mbone
3. Self-study publications
4. CBT (TDT)
5. Videotape
6. Videoconference
7. Lecture courses
8. Lecture lab courses

Figure 4: Ranked by Cost of Distribution

that the list has almost reversed itself from the cost of creation. The web is free to the user, while tickets to attend a class in a different city are expensive. This is yet another reason why web-based materials are sought by students—there is no cost to the student. Adding in the cost of classrooms, equipment (workstations, VCRs) and instructors, one can see why providers of training also look favorably at web or Mbone delivery of training. It is easy to forget that distribution cost is only one of many criteria.

From a student's point of view, the cost of attending could mean just the cost of an airline ticket, but more frequently it means time away from the job. All of the self-paced methods of delivery therefore rank high on the list given in Figure 5. Again, this is a strong driving force for web or other self-paced forms of training.

1. Self-study publications
2. Web-based materials
3. Videotape
4. CBT (TDT)
5. Mbone
6. Videoconference
7. Lecture courses
8. Lecture lab courses

Figure 5: Ranked by Cost of "Attending"

No matter what form of training is used, students require that the information be current. This is particularly important for technical subjects. Thus, there are two different issues to be considered here. First, how difficult is it to create updated material, and secondly, how does the provider distribute the updates so that students have access. The list ranking training methods based on "Ability to Stay Current" given in Figure 6 attempts to

1. Web-based materials
2. Lecture courses
3. Lecture lab courses
4. Videoconference
5. Mbone
6. Self-study publications
7. Videotape
8. CBT (TDT)

Figure 6: Ranked by Ability to Stay Current

balance these two factors and give one rank for each delivery method. Those that fall toward the bottom of the list do so mostly because of the distribution components of cost. In this analysis, it is worth noting two related important considerations.

The first consideration that is not so obvious is the ability to keep web content current. As the number of web pages grows, it becomes more difficult to revisit each page to ensure current material. The impression is that web pages are always up-to-date. We all know this is not always true. Thus, one of the major reasons that providers and students like web-delivered material is because it will always be the latest information. In fact, this often is not the case at all.

Secondly, the tools that are available for creation and maintenance of web pages are not as robust as they should be. The tools like Java, IBTauthor, and Shockwave all have features that help, but fall far short of what is really needed to create and maintain large sets of web pages. This could be a major contributor to the fact that many web pages get stale, and stay that way. In spite of the apparent ease of creation and update, reality can be very different. Newer tools will provide some of the needed functionality, but the current ones do not.

One of the key measures of any training delivery method is how effective it is in getting students to apply new skills to their jobs. Figure 7 ranks these delivery methods on this

1. Lecture lab courses
2. CBT (TDT)
3. Self-study publications
4. Web-based materials
5. Lecture courses
6. Videoconference
7. Mbone
8. Videotape

Figure 7: Ranked by Effectiveness (skills development)

scale. As you can see, the top of the list is all those methods that allow the student to actually practice the skill being taught. Those methods that do not involve actual practice fall at the bottom of the list. Again the tools being used can have a great impact on how effective any method is for the student. Web tools do not now have all of the abilities one would like to practice actual skills. They can simulate or show the skill, but actual practice is difficult. Newer tools will provide this ability but it is a shortcoming at the present. For example, it is difficult to break out of a web page and configure a network connection. This type of functionality will come with time.

Figure 8 shows how these delivery methods rank on "Interaction with Instructor." One could argue that this can

1. Lecture Lab courses
2. Lecture courses
3. Videoconference
4. Mbone
5. CBT (TDT)
6. Web-based materials
7. Videotape
8. Self-study publications

Figure 8: Interaction with Instructor

be "built in" with many of the methods, but in fact it is not. The development cost increases as one tries to build in more interaction. It should be no surprise that most students agree that instructor interaction is a desired feature of all delivery methods.

Late in 1994, SES did a survey of our students to get their reaction to various instruction methods. Figure 9 shows the results of that survey. Methods that use a live instructor ranked high on the list. Most providers of non-instructor delivery methods agree that you must capture your audience quickly or they will lose interest and never return. If there are errors in content or flaws in the delivery mechanism, students will only tolerate one or two at most. After that, they are gone and will never return. It could be argued that much of this ranking is based upon these shortfalls of products past.

1. Lecture Lab courses
2. Lecture courses
3. Videoconference
4. Mbone
5. Web-based materials
6. CBT (TDT)
7. Self-study publications
8. Videotape

Figure 9: Acceptability to Students

In addition to the considerations listed, there may be a host of others that need to be discussed. Some of the factors in Figure 10

- Personal preference
- Topic suitability
- Level of detail
- Audience background
- Skill versus knowledge
- Quality, current materials
- Demand or volume

Figure 10: Other Factors

may demand extra attention and force one delivery method over another depending on your exact application, audience and company conditions. It is known that experienced audiences are more accepting of any information delivery method. Novice groups require more personal attention. Great levels of detail are easier to relate in verbal forms (instructor). Skills are difficult to build with written information while knowledge is best given in that form. Finally, the size of the audience base may determine which form of training is best to use. A small group in one location could best be trained via an instructor, while a large group spread out over the world is costly when trained by an instructor. Consider as many factors as possible when making the choice of methods to use for your particular needs.

Finally, Figure 11 shows a composite of all the rankings done for each of the delivery methods. This is a simple

• Lecture lab courses	3.29
• Web-based materials	3.57
• Lecture courses	3.86
• Videoconference	4.43
• Mbone	4.43
• Self-study publications	4.71
• CBT (TDT)	5.29
• Videotape	6.43

Figure 11: Summary of Ranking

average of the individual rankings (1 through 8) seen in each of the previous considerations (Figures 4–10). Thus, if one

delivery method ranked 1 on each scale, the composite rank would have been 1 also. A rank of 1 on one chart, combined with a rank of 8 on another, would give a composite of 4.5. The lower the composite average, the better that method is in general. This assumes that each consideration is given equal weight. You may want to do a weighted average to better reflect your conditions.

For the Cray training department, this composite means that we will continue to focus on instructor-led courses but will begin to place more emphasis on web delivery, videoconference, and Mbone courses. Expect to see more from us in those areas.