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Delivering Training at a Distance—Technology Options

Background

There is no one answer as to which is the best technology for delivering training at a distance. It depends upon the aim of the training and the audience at which the training is targeted. However, there are some broad criteria we can identify for judging the relative value of different technology options.

- **Familiarity to trainee.** Users are more likely to be familiar with paper, books and audio programmes, and so are more likely to use training in these familiar formats. However, audiences differ, and college students and chief executives are likely to differ greatly in terms of their familiarity with computer-based training.

- **Availability of technology.** Training delivered using paper is going to be available to a wider range of people than training delivered using a computer-based medium. Again, this is audience-dependent.

- **Evaluation.** Many organizations need to know whether trainees have understood the subject matter. Effective evaluation, usually in the form of a test, is only available with some technologies.

- **Cost.** This criteria is, oddly enough, also audience dependent to some extent. As this area is more complex then it first appears, it deserves a little more analysis.

Costs can be broken down into setup costs, per-trainee costs and maintenance costs. If the audience is small then selecting an approach where you can duplicate the paper copies or CD-ROMs yourself can greatly reduce costs. The per-trainee cost is higher, but the setup costs disappear. You also have the advantage that changing the training materials to update information and correct mistakes is relatively easy.

If the audience is large in number then it may be more economic to have the paper materials printed, or the CD-ROM professionally duplicated. In both of these cases the cost is highly quantity-sensitive. By far the cheapest option is to print or press 200,000 copies. However, this incurs a high up-front cost, together with the risk of being left of a lot of useless manuals, workbooks or CD-ROMs if the material needs to change. One way of reducing this risk is to print or duplicate the first copies yourself, and to only have the material printed or pressed once you are sure it has been thoroughly tested. This might add marginally to the cost of your project, but it can best be viewed as akin to buying insurance—you only know whether you needed it after the event.

Other related documents can be found at:
http://www.questiontools.com/downloadpdf.html

If your audience has access to networked computers then you can deliver your materials using the network. This has the advantage that you can reach large numbers of users, and yet still be able to change, correct and update the training material without cost. However, although you loose the duplication costs, developing materials for a network tends to be more expensive. This is because the technologies used are harder to work with, and the much more effort has to go into designing materials that will work within the limited bandwidth available—basically, networks are limited in the amount of data they can transfer. In addition, there is often a higher expectation that the materials will be changed, as well as the need to maintain any network servers that are collecting data, and so maintenance tends to be higher.

Effectiveness. The criteria above all others is the issue of how well a trainee understands a topic after training compared to understanding before training. However, we will not use this as a criterion. While the technology choices probably do affect training effectiveness, the quality of the training design, the way the materials are created and put combined, together with the skills of the person who assembles the whole thing, are much larger factors. It is wrong to think that one form of delivery is interesting and effective, while another is old, dull and ineffective. For example, video may appear interesting—after all most of us watch television at some time—but a short time with a poor training video can quickly dispel any belief that video, in itself, is inherently interesting.

Workbook

- *Familiarity.* Books and paper are, in reality, a complex technology. However, they are familiar. Trainees understand all about contents lists, indexes, page number, chapters and sections.

- *Availability.* As a technology it is available—paper does not need a special machine, it does not crash, and will even continue to work through power-cuts (during the day at least).

- *Evaluation.* As a medium for distance training, evaluation is limited. You can provide tests users can perform and then mark themselves. However, users could cheat. Alternatively, users could complete a test and post it back, but this can then create logistic problems.

- *Cost.* Unlike CD-ROMs, workbooks and thelike increase in cost as pages are added. Against this there is the problem that page designs with a lot of space, are more readily used. Even the highly-cost conscious magazine industry concedes this point, and will usually cut content rather than cramp a design.

  One way around the cost issue is to distribute your workbook over the internet as an electronic document that can be printed (such as a Adobe Acrobat PDF document). However, this then reduces its availability.

Slides

It may seem strange to think of slides, such as those that might be used for overhead projection, as something that could be used for distance learning. However, if your organization has sales people or other representatives spread throughout a country, then you could use these people to deliver training. One disadvantage is that these people are probably not used to delivering training, and may not read the notes you send to accompany the slides. Some may be afraid of speaking to even small groups of people. However, this approach can push some reluctant trainees through the programme (i.e. those trainees that would probably skip other forms of training).

- **Familiarity.** Face-to-face training is something most people are familiar with, and so this should be accepted as an approach. Indeed, the greatest hurdle will often be to get the representatives to accept that they should deliver the training.

- **Availability.** As any slides can be presented on paper, or via any available projection equipment, there is no obvious technology hurdle.

- **Evaluation.** Tests can be conducted and marked by your representatives. If evaluation is important to you then this is a real benefit, as test invigilation is the only sure method of ensuring the integrity of tests.

- **Cost.** The obvious cost is only in the reproduction of slides and handouts. However, this approach absorbs the time of the person delivering the training (a hidden cost) and this can lead to two effects. The first is that the person does other things less well. The other is that the representatives' immediate manager makes your training low priority.

Audio CD-ROM or tape

The advantage of an audio programme is that it can be delivered anywhere that suits the trainee—on the train, in a car, in a park or in an office. Training via this medium can be made interesting, and one successful approach can be to adopt the magazine or documentary format used by some successful radio programmes. However, these radio programmes will cut content to fit the format and maintain interest, whereas this is not always an option with training, where a fixed amount of information has to be conveyed.

- **Familiarity.** Almost all trainees will be familiar with radio programmes, and most will be familiar with the magazine and documentary formats used.

- **Availability.** The means to play audio is probably the most widely-available technology, although it is almost always individuals who possess the equipment rather than the organization.

- **Evaluation.** This technology alone offers few opportunities for evaluation. Trainees can be asked questions and then given time to write their answers, although this may not be possible if the trainee has chosen to listen to the programme in a car.

- **Cost.** Copying CDs can be cheaper than printing workbooks. Pressing CDs for large numbers is cheaper still. Added to that, the cost does not increase as more material is added. However, audio programmes are harder and more costly to amend than programmes that use written materials.

Is 66 minutes really the limit? There are CDs that can hold up to 80 minutes of audio. However, if you use these then some audio CD players will not be able to play them.

I've been told that several hours of audio can be compressed onto a CD-ROM? Yes, this is true. We compressed 17 hours of audio, image, animation and video onto two CDs for a large company training programme. However, normal audio CD players cannot play this highly-compressed audio.

Maybe I can use tapes instead? Yes, tapes can be better than CDs in some circumstances, as more people have in-car tape players than have in-car CD players. However, if large numbers are required then tapes will be a little more expensive than CDs. On the other hand, for small numbers tapes can be cheaper and can hold more audio (up to 2 hours). However, 90 minute tapes are probably better, as the two-hour tapes use very thin tape that can become entangled in some tape recorders during playback.

Audio CD-ROM plus booklet

A booklet combined with an audio CD can provide a method of training that is both accessible to a large number of people, while also providing a means of delivering some visual information. However, the booklet can easily become detached from the CD, reducing its value and creating expense when replacements have to be provided.

- *Familiarity.* Trainees are likely to be familiar with both audio CDs and books, and so both mediums are likely to be accepted. However, trainees will probably not be accustomed to using them together.

- *Availability.* This approach is slightly less available than audio CDs alone, as the trainee has to refer to the booklet. Moreover, there should ideally be references in the audio to the place in the booklet to which the trainee should refer.

- *Evaluation.* Self-marked tests can be provided in the booklet. Alternatively, users can be required to fill in the test and post it back for marking.

- *Cost.* There is inevitably two costs to this form of training—the CD and the booklet. However, there is a third hidden cost, and that is where changes have to be made. As the CD and booklet depend on each other it is hard to make changes that do not effect both. This increases editing and production costs.

Multimedia CD-ROM

Few computers these days come without the capability to play interactive, multimedia CD-ROMs. You should not assume, however, that all computers in your organization have this capability. Companies with large networks sometimes order computers without sound cards, CD and floppy drives, because this reduces cost and increases security. If you are considering a multimedia CD-ROM then you should check this first.

Multimedia CD-ROMs can include several hours of spoken explanations, animations and video, as well as interactive tasks and tests that are automatically assessed. The trend within the training industry has recently moved away from CD-ROMs towards delivery over a network. The relative strengths of each are discussed later in this article. The key advantage of CD-ROM is that it can deliver speech and video effectively.

- *Familiarity.* Trainees tend to be less familiar with this delivery medium, and careful attention needs to be paid to design to ensure that trainees can use the software.
- *Availability.* Most computers can deliver this material. However, it is always going to be less accessible than material delivered on paper or via audio.
- *Evaluation.* This provides one of the best opportunities for evaluation. Not only can trainees take tests, these results can be immediately marked, saved, emailed, or sent across a network.
- *Cost.* Developing multimedia material, particularly interactive tasks, can prove expensive. CD-ROM reproduction, however, is exactly the same cost as audio CD reproduction.

Hybrid CD

It is possible to produce a CD that contains both audio and multimedia data. In other words, trainees can either insert it into an audio CD player to listen to the audio programmes, or they can insert it into a computer to use the multimedia training. However, if one third of the CD is given over to multimedia information then the rest of the CD (two thirds) is only going to be able to hold 40 minutes of audio programme.

- *Familiarity.* Users can use the same CD to receive the training in the format with which they are most familiar.
- *Availability.* This has the advantage of delivering training to anyone with an audio CD, and delivering the more capable computer-based training to anyone who has a multimedia-capable computer.
- *Evaluation.* Only the computer-based multimedia training offers good evaluation capabilities.
- *Cost.* The development cost is doubled, as both multimedia and audio training has to be developed. There is a saving in production cost, and possibly some distribution issues, as the one CD should fit all trainees. However, unless you plan to distribute many thousands of CDs there is probably little cost saving to be had here. The main benefit is in delivering the most effective training given then circumstances of the trainee.

Internet or intranet

Delivering training via a web browser over an intranet or the internet is very popular. One advantage is that browsers are installed on almost all new computers, and so this form of delivery requires no special installation. This is a major benefit in some organizations, where installing new applications on networked computers requires a lot of work and much testing and internal approval. However, most of this training is created using Macromedia's Flash application, and this is often not installed as a browser plug in on many corporate networks. Consequently, delivering your training via a web browser might not be quite as easy as it first appears, and you can run into the same problems you might experience if you wanted to install a new application on the organization's networked computers.

- *Familiarity.* Computer users tend to be familiar with web browsers and this can help with acceptance. However, the interface for controlling the training needs to be carefully designed.

- *Availability.* This, again, is restricted to computer users whose machine is connected to a network.

- *Evaluation.* This approach is well-suited to evaluation, with the capability to save and analyse results centrally so as to provide group averages.

- *Cost.* Development costs can be high, and getting training to work reliably in a web browser often takes more programmer time and effort. Nevertheless, there are no paper or CD reproduction costs. Nevertheless, there will be maintenance costs. Unlike paper or audio-based training, it is not a 'fire-and-forget' solution. If something stops working (and on networks this is common) then you will need technical help to find out what the problem is.

Web browser or CD-ROM-based application

Delivering training via a browser entails all of the content being held on one or more servers on the network. This has an advantage and a disadvantage. The large benefit is that changes can be made immediately, with no CD-ROM repressing costs. The disadvantage (and it is a large negative) is that most networks are limited and cannot transfer the large amounts of data needed for sound and video.

The drawbacks of web-based training. For some users web-based training (also referred to as e-learning) has been a disappointing step back in time to the old page-turning days with pages of text and an ever-present Next button. There seems to be little doubt that some of this training is less engaging and less effective. Having said this, some less imaginative CD-ROM-based training still manages to include little other than text lists and a Next button.

The drawbacks of CD-ROM-based training. However, while a CD-ROM might deliver a richer user experience, changes still entail repressing the CD-ROM. This also carries the logistic costs of getting the CD out to trainees. There is then the further problem of not knowing for sure whether your trainees will use the new CD or the old CD-ROM. Version control in an organization is rarely simple.

Having your cake and eating it. In one of our projects we managed to use both the network and a CD-ROM to overcome these problems, delivering a CD-ROM-based application that checked a server every time it ran for any updates. From the user's perspective, they had the latest course material, all of which included audio and video. From the training manager's perspective, the course could be adjusted overnight without repressing the CD-ROMs. From the network manager's perspective relatively little data had to be transferred across the network—it was just the data used as a replacement for redundant data on the old CD.

Which to chose? At the moment the fashion has been to deliver material in a browser—and this is the problem, it is fashion. If you have a network where it is difficult to install new applications, or where the training material changes rapidly, then delivering via a web browser is going to be a worthwhile option to consider. If engaging sound and video are a must then you should not overlook CD-ROM.

Delivering using both CD-ROM and a web-browser

Some materials developed for CD-ROM can be made available over a network with little extra effort. Tests developed using the Question Tools software can be exported as web pages or as a question bank—the tests can be taken in either a web browser or via a secure application. Likewise, some materials developed using Macromedia's Flash technology can be delivered on CD-ROM as well as in a web browser, although the latter requires a plug-in and is not quite as easy as the simple choice provided by Question Tools.