

A critical look at current Web Based Training efforts

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(Paper appears in the proceedings of ICCE 98)

Abstract: In this paper we take a look at the plethora of attempts to use the Web (i.e. World Wide Web technology in Internet or Intranet environments) to support training, teaching and learning applications. We first look at "standard attempts" and argue that most of them are futile efforts: we show how common misconceptions will prevent many efforts to be successful; we discuss some important issues in more detail and summarize what future Web Based Training (WBT) systems will have to provide to have a chance to be successful.

1. INTRODUCTION

Agriculture is often considered one of the more traditional and conservative areas of human endeavors. However, if you did put a peasant of around 1900 into a modern tractor which - completely computerized and helped by GPS - will e.g. be able to plow a huge field with centimeter accuracy with little human effort such peasant would be at a complete loss and would feel almost like being in a nightmare. On the other hand, if you took a university professor of around 1900 and put him into a lecture room of a typical today's university, he might find the control of electrical lights a bit more elaborate but would be quite at home even in the (percentage-wise) few cases where blackboards have been replaced by whiteboards. Surely, there are exceptions. But the basic message of above comparison is clear: educational technology has not moved forward at anything close to the rate of other developments.

It is this fact combined with the knowledge that "training kids from 6 to 16 or 26 so that they are prepared for the rest of their life" just does not work any more in a society where knowledge increases at an incredible rate, and where the average person is likely to start a job in one area but to end up in a rather different one that has convinced society, that our educational systems have to change, and that such change will also involve the use new technologies.

This conviction is definitely justified. Yes, we have to shift to a system of life-long learning on demand, training on the job, adult education, distance learning - you name your favorite buzz word - and computers and networks will play a major role. Yet, most efforts that are visible today are fueled by the enthusiasm of the growing web but are "blue eyed" approaches to a difficult subject carried out by persons who - more often than not - not only ignore, but are just plain unaware of past experiences. To be more specific: the idea to use computer technology (and networked technology!) to support training and learning dates back to the early sixties; yet most lessons that could be learnt from some 35 years of failures of CBT (Computer Based Training) are ignored in most current day efforts to a degree that is absolutely astonishing to say the least.

2. THE STANDARD WBT APPROACH

Using today's Web-page editing tools it is a simple job to put a sequence of HTML-page explaining some topic on a Web server, the presentation including pictures, simple animations or other enhancements (such as audio or video clips). Providing some forms for feed-back, adding email for communication and a few introductory pages and - presto- a WBT system is ready.

In doing so, in 99 out of 100 cases, the most basic lessons that have been learnt since 1960 are ignored. Learners are forced through a rather rigid sequence of pages with little to escape

resulting in what is called the "tunnel syndrome". Fonts, colors, flashing, etc. are used in a very ad hoc way, gimmicks (considered amusing but soon seen as a nuisance by the learner) abound, interaction of learners and experts are often supported in an at most rudimentary fashion ... and the list can be expanded arbitrarily (see e.g. [1] or [2] for a detailed discussion).

Basic rules that should be well-known are often ignored: we have studied a total of 200 "educational sites" and all but 3 violated or ignored one of the following issues, usually most of them:

- (1) Before starting to work through some material learners must be clearly informed about what they will be presented with, how long it will take them to work through the material, what level of knowledge and what terminology is assumed, and what they are supposed to have learnt after working through the material, etc.
- (2) Persons differ in learning style (e.g. visual or verbal).
- (3) Persons come to a site with different levels of knowledge, hence have to be treated differently.
- (4) Questions asked by one person are usually of interest also to other learners; and should be archived as valuable feedback for the author of the educational material.
- (5) If some topic is not understood by the learner there has to be a way to compensate this. Possibilities include making a "background library" available that contains further material; allowing to consult FAQ's, permitting to ask questions to others online; or, at least, allowing discussion in an asynchronous discussion forum. Further it is essential that learners can ask an expert (at least asynchronously), and such question/answer dialogues should (a) be made available to other learners and (b) be seen as valuable feedback.
- (6) Material must not be read-only, but learners should be able to work with it (in a sense to be explained in section 4).
- (7) "Authoring" of courseware material must be made easy by a combination of "re-usability", "authoring on the fly" and "template editing" (see section 5).

We will discuss some of the most important aspects alluded to in above list in the following three sections.

3. SOME COMMON MISCONCEPTIONS

Many designers of WBT material get caught up in the belief that courses and course-environments must be "glitzy" (Hollywood-like), full of colorful graphics, and should be as 3 D-like as possible. Reality shows that too many pictures and graphical gimmicks distract rather than help and that 3 D models as user interface (e.g. based on VRML) turn out to be annoyingly slow to use once the luster of newness has worn off. We are aware of at least 50 sites that offer a "virtual campus" in the sense that a 3 D model including various (groups of) buildings are shown as navigational aids. The idea to use 3 D scenes for navigation has been tried out a number of times in the past for other applications, particularly for electronic shopping, and results have been disappointing throughout: locating information in an alphabetically sorted menu has always turned out to be more efficient than navigating in a virtual 3 D environment. One of the largest attempts - and failures - was Yahoo's 3 D environment to help when searching for information: it was introduced end of 1996 as "big breakthrough" and the "largest virtual world ever" and has died a quiet death, since.

This is not to say that VRML (3 D) user-interfaces and graphic-rich pages will not play an important role in future WBT efforts, yet a careful balance has to be achieved. Other facets, like quality and clear structure of the material, good communication facilities, etc., etc. are more important than a flashy surface! Basically, the fact that certain things are possible does not mean that they should or can be used effectively for teaching. Early multimedia

courseware ten years ago was often annoying because of the over-abundance of gimmicks like useless animations, a mixture of colors that would put rainbows to shame, objects blinking and flashing all over the screen, etc. The enthusiasm that (then) modern technology made such features possible led some courseware designers to over-use them, and we tend to see similar situations now again with a technology that is a few notches better.

Another dangerous misconception is that all persons learn the same way. Although it is well-known in cognitive psychology that there are different learning types (e.g. visual, verbal, symbolic; or persons where the haptic or acoustic component plays a particularly important role) this is largely just ignored in WBT efforts. The strength of WBT is that it can be adapted to individual needs, and this has to be exploited to the fullest. Yet it is almost ironic to see that the opposite is done in many distance teaching efforts where the emphasis is to teach geographically dispersed groups at the same time using technology that basically enlarges the traditional lecture room, thus further decreasing individuality.

Persons differ in how they learn, as just has been emphasized; they also differ in what they know. Again, the potential strength of WBT is that (e.g. by having suitable pre-tests) the knowledge level of a course can be adjusted to the individual learner, something not possible in standard classroom mode, yet again an aspect most "distance teaching" WBT efforts completely ignore.

4. WHAT IS NEEDED FROM A GOOD WBT SYSTEM

Over the last years a team of researchers and developers under our supervision has worked on a **General Networked Training and Learning Environment (GENTLE)** that seems to comprise most desirable features. This has been reported on at ICCE 1997 [3], see also <http://www.iicm.edu/gentle.htm> and at ED-MEDIA 1998 [4]. Hence we do not want to go into details concerning GENTLE but rather just want to mention that a number of major undertakings based on GENTLE are getting under way in 1998. However, some issues have turned out to be particularly important and hence warrant explicit mentioning.

First, preparation of courseware should be as easy a possible. We will discuss some aspects of this in the next section 5.

Second, the importance of administration of courses, of students, of working groups, of teachers and the provision of methods for billing, assessment and statistics gathering must not be overlooked. We do not go into further details concerning those points here, but refer to [4].

Third, and we have already discussed this in section 3 to some extent, WBT gains much of its strength's due to individualization in form (i.e. taking into account different learning styles) and content (i.e. taking into account different levels of knowledge). Systems that are rigid to the extent that such customization is not possible cannot be considered serious approaches to WBT.

Fourth, and we elaborate a bit on this in what follows, learners should not only be able to passively work through material but must be able to "message it" and work with it. It is our belief that such features are essential for WBT, and, as a matter of fact, for most other Web applications, also.

Learners must be able to not only retrieve pages, but they also must be able to:

- (1) Attach notes to them that are later readable again by themselves, or by a well-defined group of persons;
- (2) Start a (synchronous) chat or asynchronous discussion based on the current page;
- (3) Define a link from the current page to any other material, and vice-versa, such links should be visible only to the individual learners themselves, or to a well-defined group of persons;
- (4) Start a search in a "background-" or "reference-" library that is associated with the current page; note that different sections of a course can and should have different background libraries so that searches do not yield (too much) unwanted material;
- (5) Combine the current page with material in a "personal collection" (or "group collection" for cooperative purposes);
- (6) Ask questions to experts or other users. Answers may arrive immediately ("during office hours" or if other users are online) or at some later stage, but are stored for later perusal by other persons. Thus, it may happen that when asking a question the answer is immediately supplied by the system since the same question was asked already by someone different some time ago.
- (7) Finally, as a kind of "catch all", pages as such can start interactive programs (like simulations, calculations, tests, etc.)

It cannot be overemphasized that WBT systems weak in (1) -- (7) are perilously similar to earlier CBT systems that, overall, have not been terribly successful. It is important to understand that enriching Web material by communication is essential, but not enough: users also have to be able to annotate, link and rearrange material for their personal needs.

5. SOME HOT ISSUES

It has been claimed over and over, that the creation of high quality course material is necessarily expensive, this being the main stumbling block for WBT (or earlier CBT). It is our contention that Hollywood-kind-of productions are indeed expensive, but in many situations not necessary. Well structured solid material in an environment satisfying the seven issues (1) - (7) in sections 2 and 4 will be quite satisfactory in most cases and indeed superior to glitzy material in an environment that ignores (1) - (7).

What remains it to assist authors of courseware to the largest possible degree. Basically, there are three approaches to it:

- (i) "Authoring on the fly" [5]: a live talk (based e.g. on a PowerPoint presentation) is digitally recorded including sound and pictures or videos of the instructor; a presentation recorded in this fashion can be perused later at leisure, jumping to designated bookmarks, using a search or digital "fast forward" or "fast backward" to locate whatever is desired;
- (ii) "Re-use of material" [6], [7]: the key issue is to design courseware in small modules that can be re-used independently. This is only feasible if modules are associated with a rich set of meta-data, so that potential authors can find - among thousands of modules - those that might be of interest.
- (iii) "Template authoring": the idea is to define sophisticated templates and course-creation wizards that reduce authoring of a course to going through a dialogue in which one uses self-prepared pages or modules in the sense of (ii) without need to worry about links, navigation icons, page numbering, consistent layout, etc. Work in this direction is in progress in a number of systems, GENTLE [4] being one of them.

There is one other critical issue that WBT systems have to come to grips with: Communication speeds (and in some places communication costs) make it impractical to work online with a remote server with educational material all the time. Thus, material must also be shippable on e.g. CD-ROMs (or must at least be downloadable in one burst). However, such solution must not destroy all the desirable communicational, co-operational and individualizing features available in a network as described above. I.e. local solutions must be based on the premise that a connection to the central server can be established from time-to-time and it is during such connections that questions, answers, annotations, discussion contributions etc. can be exchanged in both direction. No system doing this in a "perfect way" is known to us at the time of writing. Yet, the demand for such hybrid solutions is clearly recognizable.

6. SUMMARY

WBT is a "red hot topic". Thousands of efforts are underway in this area. Most of them do not have what we would like to call "critical mass". We hope that this paper has shown that good WBT systems are still more than rare, but - like GENTLE [4] - are visible on the horizon: we do know what we need, but detailed implementation and some experimentation for fine-tuning remain to be done.

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