ABSTRACT

A critical part of any instructional development process is the course review, whether it be called formative evaluation, instructional validation, or content and style review. It is particularly important for computer-based training (CBT), in which the final product is usually delivered to one user at a time, out of the developer's sight. In theory, CBT reviews encompass thorough evaluation of the instruction by content experts as well as extensive testing of the course by potential users, both under ideal conditions. This paper will address the task of instituting a practical, yet beneficial, CBT review process within the constraints of an organization—how to organize available time and personnel such that your CBT course receives the best possible validation. The review process used by CBT developers at SAS Institute will be discussed.

INTRODUCTION

Suppose that you are developing a computer-based training (CBT) course on a technical topic. You have read that sending the course through an internal review can produce valuable improvements, so you ask several people to take a look at your course. When the review takes place, however, the process you experience seems far removed from the smooth, productive exercise described in the textbooks. A company or organization is not, after all, an ivory tower, and conducting a successful review in the organizational setting requires strategies that take account of "real world" considerations.

RATIONALE FOR REVIEWS

In any systematic development model for computer-based training, reviewing the instructional material plays a critical role.

Figure 1 illustrates one such model, consisting of five stages. The first stage, analysis, includes initial topic research, needs assessment, and the determination of course goals. At the end of this stage, you will know what you need to teach, whom you will teach it to, and what the user will be able to accomplish at the end of the training. One of your course goals, for example, might be "The trainee will be able to print a one-year budget report using the on-line spreadsheet." The goals define what results can be expected from the CBT.

In the second stage, design, you develop the basic structure of the course. By performing a task analysis, you determine which small tasks are required to reach the course goals, and how to sequence them. From the task analysis you develop the main branches of the CBT. Generally, each branch will lead to mastery of a particular task or goal of the course.

The third stage, development, contains the actual creation of CBT screens to fill in the main branches you have already outlined. Graphics, practice exercises, and question frames are all incorporated into the course at this stage.
In the fourth stage, review, the draft of the course developed in stage three is subjected to a thorough critique. Only in rare instances will the results of the review impose changes on your initial analysis (stage 1). However, it is likely that part of your task analysis (stage 2) may need correction, and more likely still that some of the individual frames will need revision. The purpose of the review stage is to make those revisions in a working copy of the course, before it reaches final production and distribution among users (stage 5).

When your CBT development process is grounded upon thorough course reviews, you have a very good chance of producing an effective computer-based training course.

**Types of Reviews**

The review process encompasses three different review types, each with a slightly different function and procedure.

**Content Review** This is often the first review in the series. During the content review, the course is checked for technical accuracy. This ensures that the course is free of factual errors or misleading instruction. For example, at SAS Institute we sometimes develop a CBT course on a software product that is itself in development. So we check that the procedures we teach still match the programmers' latest enhancements to software.

**Student Evaluation** This review contains two components: a small group test (alpha test) and a larger field test (beta test). Both are designed to evaluate the CBT's effectiveness with actual users, to determine if the instruction enables them to perform the desired tasks. No matter how technically "accurate" a CBT course is, if it doesn't teach, it isn't worth much.

**Stylistic Edit** This review is usually conducted just prior to final production, after other revisions have been made. The purpose of this edit is to check that names and references are consistent and match company standards, and that typographic and grammatical errors have been corrected.

Sometimes these reviews are conducted as separate steps in a sequence. Often, however, time constraints require that they overlap or even take place simultaneously. Each type of review has a different purpose and, to an extent, different personnel are involved. The factors to consider are the same for all three reviews; however, the way you prepare for each review will differ.

**CONSIDERATIONS FOR CONTENT REVIEW AND STYLISTIC EDIT**

**The Medium**

Imagine now that you have been asked to review a CBT course; as you proceed, you discover this is not an easy task. You cannot write on the display screen to make a comment about a particular frame. You cannot lay two frames side by side to compare them. If you need to leave the course and return later, you may not be able to mark your place. If you decide to complete the review at one sitting, the computer system may crash. Because you are viewing a draft copy of the course, the programming may contain bugs that lock you into a particular screen or throw you into loops. To investigate different branches of the course, you may need to go through the same material several times over.

Thus, the very traits that make CBT such a powerful learning medium--interactivity and individualized response--make it also a cumbersome medium on which to evaluate courseware.

As the course developer, you can take several steps to minimize the difficulties created by the medium and facilitate the task of your reviewers.

- When your CBT course is ready for review, place a clean copy in a read-only file library that is easily accessed by the reviewers. Make sure all necessary function keys are set up. The reviewers should have to do very little to get into the course, and it should appear very close to finished form.

- Write a list of "how-to" instructions that specify how to get into and out of the course. Include "escape" options, in case they get stuck on a particular frame or lesson.

- You should also specify the type of terminal they require and whether any external files need to be allocated.

- Indicate whether you want the reviewers to follow a particular sequence of lessons in the CBT.

- Each reviewer should have a hard copy of the course that looks as much as possible like the on-line screens. Organize the hard copy as your course is organized; for example, by module and lesson, and label each section and frame clearly. If there are supplementary screens, such as HELP screens or indexes, print these on colored paper so they are easily located. Put all the hard copy in binders.

- At the front of the first binder, place an outline of the entire course.

On your instruction sheet, emphasize that the reviewers should not "read" the hard copy page by page. Instead, they should take the course on-line, only using the hard
copy as a place to write their comments or make comparative evaluations.

- Write a short questionnaire that directs the reviewers' attention to specific aspects of the CBT, such as HELP screens, examples used in the instruction, graphics, and so on.

With adequate instructions, the reviewers' task will be much simpler, and they will be able to concentrate on the substance of the review itself.

**Personnel**

The participation and input of a wide variety of people are crucial to the success of your reviews. Unfortunately, the very diversity of their perspectives can, if not well managed, hamstring the review effort.

**Technical Experts** These are usually developers or engineers--people who know just about everything there is to know about your subject matter. Unfortunately, the job description of technical experts rarely includes their being technical experts--that is, they have their own deadlines to meet which do not accommodate the time required for a CBT review. They are essentially doing you a favor by participating in your review, so you cannot very well hold them to a tight schedule.

Technical experts are often accustomed to the "learn-by-reading-the-manual" method of instruction. Consequently, they may feel impatient both with the user-friendly style of CBT, and with its limited scope--the fact that any CBT course does not encompass everything there is to know about a particular subject. Nevertheless, technical experts are invaluable for catching any factual errors in your course. They may also indicate where procedural "shortcuts" can be made, so you avoid teaching the "long way round" to do a particular task.

**Manager** Your manager may also review the course, usually during the early stages. Often he or she feels pressured by organizational demands to get the course completed and distributed. The manager may review it, for example, with an eye to how much production time will be required. Management is also concerned with negotiating smoothly among the other participants in the review. Finally, the manager rarely has much time to review the course, and wants to move through it as quickly as possible.

**Editor** The editors or publications staff naturally are concerned with stylistic conventions, consistent terminology, grammar, copyright symbols, and so forth. They are often unfamiliar with the course subject matter, and may not be aware of programming limitations that affect CBT development.

As you can see, each member of the review team starts from a different perspective. With a little work, however, you can unify these perspectives and thereby increase the power of the review. Your reviewers need to know what you want to be the focus of their efforts; the more clearly you outline goals and procedures, the fewer assumptions they will be forced to make. One approach is to write an explanatory memo that accompanies each review copy of the course.

Include in this memo the following:

- a description of the course including the prospective audience and subject matter (for example, "The basics of XYZ for inexperienced computer users")
- why you are asking for this reviewer's input ("You are the resident expert on XYZ")
- how the reviewer can benefit from the review ("If people can learn XYZ in our course, they won't need to bother you with questions")
- what you would like the reviewer to concentrate on during the review and an acknowledgment of any shift in perspective required ("You probably know four different ways to do procedure X. Please check to make sure we are teaching the single easiest way to do X," or "Please check that my references to procedure X are consistent.")

**Time**

In addition to different perspectives, everyone participating in a review has a different time schedule, none of which is likely to match your CBT course development schedule. It can be extremely frustrating to work long hours getting the course draft out to the reviewers, only to wait for its return.

That wait can be minimized, however.

- Your own development schedule will determine generally when the review is to take place; you need to allow about five days for every day of work the reviewer will spend. For example, if you anticipate the reviewers needing two days to go through the course, ask for their comments to be returned ten days after they receive the course draft.
- Two to three weeks before the review check with every prospective reviewer, in person if at all possible, to see whether they can allocate the time specified. If they can't, don't press the issue; ask them to recommend someone else instead.
- Follow that meeting with a memo, again clearly indicating when they will receive the review materials, how much of their time it will require, and when you need their comments returned.
A few days before the review, get a final confirmation by phone from each reviewer.

Now go back to your own development schedule, and add one week of "float" time after the review period. Plan to work on your graphics during that week, or attend a conference, or organize your data files. Despite the best efforts of you and your reviewers, some of the review copies will be returned late. If you build in some float time, your own work on the course can proceed according to schedule.

In general then, successful content and stylistic reviews may be achieved by a little forethought and a lot of communication.

CONSIDERATIONS FOR STUDENT EVALUATIONS

Those principles hold for student evaluations as well, though specific procedures differ somewhat from the other review types.

The Medium

Actual trainees evaluating the CBT course may be even less accustomed to the medium than other reviewers, and less tolerant of programming or system difficulties. Consequently, the instruction sheet you wrote for content reviewers is even more important here. Make sure the vocabulary in those instructions is appropriate for the trainee, and do not presume more knowledge for the review instructions than you do for your course. For instance, if your CBT course will teach new users how to allocate a partitioned data set, don't expect them to perform such an allocation just to begin the review!

The student evaluations probably will not include course hard copies, so you should provide a place for users to note any comments or questions they have, perhaps a blank sheet of paper labeled with the name of each lesson and a place to record how long it takes them to complete the lesson. Also, you may still want to include a questionnaire addressing specific aspects of the CBT. If you include a pre-test or post-test, be sure to emphasize that it is the course, not the user, that is under evaluation. There is no such thing as a "stupid user error," only poor instruction.

Finally, someone should always be present during the student evaluation who can alleviate any computer problems that might arise—disappearing data files, endless loops, and so on. As the course developer, you may be the best candidate to administer the student evaluation, and you will have an excellent opportunity to observe any such problems, so you can clear them up later during revision of the CBT.

Personnel

Although the student evaluation involves different personnel than the content and stylistic reviews, you must still take into account their perspective on the review as well as your own.

Students In contrast to your staff reviewers, the users taking a CBT course care little about production time, or copyrights, or four different ways to do a certain task. They want to be able to move easily through the course without being confused, without the computer system locking up, and without having to ask for help to escape a difficult screen. Moreover, they want it to be interesting, neither too hard nor too easy, and relevant to their work on the job.

Just as in the content and stylistic reviews, an explanatory memo to participants in the student evaluation is a useful way to coordinate their objectives with your own. This memo can also serve as the initial contact to invite users to participate in the evaluation, particularly if you point out the benefit to them of learning new job skills.

Time

While users may be eager to join in the student evaluation, their managers may be more reluctant to allot several days away from their desks. Try to arrange the student evaluations to accommodate users' daily tasks; several half-days may be more convenient than one full day, for example. Again, give plenty of advance written notice of when the review will take place and for how long.

One final point that applies to all three types of reviews: at the end of the review process, send written thank-you notes to everyone who was involved. They will be more willing to review your next CBT course if you acknowledge their time and effort on this one. And their familiarity with the review process will facilitate your arrangements next time round.

CONCLUSION

As you can see, it is not an impossible or even a monumental task to achieve a successful review. Recognizing the different considerations is the first step: the medium itself, the contrasting perspectives of personnel, and insufficient time. Now, with a little planning and communication, you can establish a smooth, productive review process.
APPENDIX

The written materials discussed in the paper are listed below.

explanatory memo

Used in all types of reviews to describe the CBT course and the review process.

instruction sheet

Used in all types of reviews; lists step-by-step instructions to access course, proceed through course and record comments.

hard copy

Used in content reviews and stylistic edits as place to record reviewers' comments.

review questionnaire

Summary questions to reviewers, addressing key aspects of CBT: HELP screens, examples, exercises, graphics, menus, etc.

pre-test, post-test

Used only in student evaluations to ascertain that the CBT course effectively taught what it was intended to teach.