E-learning Course Design

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Introduction

Imagine your company is embarking on a program to implement e-learning to complement its classroom training program, and you have been recruited to design some of the new courses. This article lays out a list of questions and hints that can serve as a checklist of things you need to consider when designing e-learning courses. Not all of these points apply to every situation. They must be appropriate to the objectives, the learners, and the content. Unfortunately, as the creator of the program, you are often not the best judge of these things. The most effective way to evaluate them is to have some typical learners go through the course with you. This is called formative evaluation.

Target Audience

It is essential to begin by identifying the target audience and determining both how much they already know about the topic and whether they have the necessary computer skills to access and complete the course.

Objectives

Critical for helping learners get the most out of an e-learning experience is a clear statement of learning objectives. You should consider attitude objectives as well as knowledge and skill objectives. You should state these objectives in measurable terms with expected outcomes and explain the criteria against which the outcomes will be measured. It is important to share these objectives with the learners so they know what is expected of them.

Pre-assessment

Before beginning the course, you may want to provide the learner with a pre-test or self-assessment that will enable him or her to bypass a module or course if they already know the material or have the required skills. Another option is to have the results of the pre-test direct the learner to specific sections according to where his or her skill deficiencies exist.

Design

Once the learning needs and objectives have been analyzed, the next step is course design. Instructional design is a lost science. Developed in the 1960s as a systems approach to the design of instruction, it employs practices that have worked very well in engineering. Instructional design has received some bad press for the time it takes, but that press failed to recognize the quality and effectiveness of the learning that results when it is done properly. The problem has often been that instructional design is used by people who haven't acquired the skills to do it correctly. Everyone is in a hurry today and wants the design done immediately. It is possible to do good instructional design quickly without abandoning the principles behind it. However, too often steps are skipped, for example, the analysis step because someone "knows what they need".

First, it is important to select a learning strategy that is appropriate to your objectives. Some examples of such strategies include story telling, sequential, competency-based, criterion-referenced, evaluated, co-operative, case studies, discovery or constructivist, role playing, simulation, games, experiential, laboratory, etc. Keep in mind that the most effective learning occurs when learners are actively engaged.

Does the content design reflect the needs and interests of the intended audience? Are the tone, level of content, and interactivity appropriate to the audience? Content needs to be clearly organized divided into appropriate chunks that are small enough for learners to assimilate. Be sure that you have provided for enough active exercises and practice to ensure the acquisition of the necessary skills and knowledge by the learners. The exercises should be directly related to the objectives and should reinforce key messages.

You may also want to provide ways for learners to organize the material (i.e., an advance organizer, see http://uts.cc.utexas.edu/~best/html/learning/advorg.htm for more information). In addition, resources that the learner can use for supplementary learning or clarification, as well as jobs aids and performance support (easily accessible pieces that workers can use for quick reference while working), may be included.

It is even possible to design the instruction to be adaptive, so that it can adjust itself to learners' needs based on their responses to the pre-test and their performance on previous modules. Prior performance can direct learners to only those modules that they need, allowing them to skip others.

Motivation

Learners need motivation to continue. Your course should appeal to their intrinsic motivation to learn, to do a better job, and to enjoy doing it. Does your program provide sufficient consistency and yet variety to maintain the interest of the learner? An e-learning course can engage the user through novelty, humor, game elements, testing, adventure, unique content, surprise elements, etc. Frequent learning checks and appropriate and timely feedback can also motivate the user. Above all, it pays to address the learner's primary concern: what's in it for me?

Aesthetics

The visual appeal of courses can help determine an e-learning initiative's success. For instance, is the overall design attractive and appealing to the eye and ear? Is the use of color appropriate and pleasant? Does the course have a consistent look and feel? Screens should be neither too busy nor too stark, and the overall appearance should be professional. In addition, icons or clear labels should be appropriately used so that users don't have to read excessively to determine program options.

Navigation

If the course is easy to navigate, the e-learning experience can be beneficial even for users with minimal computer skills. Make sure you provide instructions about the navigation through the course. The directions and navigation controls must be clear and intuitive. Answering the following questions may help you determine whether your e-learning course is easy to navigate.

- Have you provided a course menu (content map), one which links to all parts of the course so that the learner can choose where he or she will start or navigate to next (self-directed learning)? Are there several types of menus to help different learners?
- Can learners determine their own path through the course, if appropriate?
- Have you provided a glossary as an option to clarify meanings of words?
- Is an exit option always available?
- Does branching to other topics create a sense of being lost?
- Is there a way for the learner to tell how far along she is? For example, are there progress bars, or an indication such as page X of Y?
- Is the navigation consistent among courses, chapters, pages, tests, etc.?

Media

The term rich media is used to describe the use of graphics, animations, video, and sound. It can be very effective in helping the learning process, but it is extremely important that its use be appropriate to the topic, the audience, and the objectives, and not be merely for effect. The following questions may help guide you in its use.

- Is the on-screen text easy to read (font size and color)?
- Is the amount of on-screen text appropriate?
- Are graphics and illustrations appropriate to the topic, audience, and objectives?
- Do screens require scrolling?
- Are there too many or too few graphics?
- Is the use of animation or video distracting?
- Does the use of rich media sound and look professional?

Interactivity

To maximize learning and maintain interest and motivation, it is important that web-based learning be designed to be as interactive as possible. Interactivity is not simply clicking on buttons, watching animations or video, or listening to sound. It involves active participation by the learner—making choices, answering questions, going through simulations, etc. The learner should be engaged through the opportunity for input. Having said this, the interactivity needs to be appropriate to the course's users, content, and objectives, in terms of both type and amount. It should not be gratuitous, but rather be designed to promote learning of the course's objectives. There are various types and levels of interactivity, which are listed below.

- Choice of where to go next. This involves basic navigation capabilities, planned choice points, and optional access to anywhere in the course via a course menu or map.
- Supplementary resources or activities, for example, texts, journals, corporate documents, or web sites where a learner can go for additional information
- Branching as a result of answers to questions

- Exercises with more than one step (e.g., research, case studies, and laboratory exercises)
- Games and simulations
- Opportunity to communicate with a mentor or expert
- Threaded group discussions (either synchronous or asynchronous)
- Question and answer. Questions can be posed at various stages. There may also be interspersed quizzes.
- Feedback. Are there rich and unique feedback features?

Feedback

Feedback for questions and answers must be carefully designed. Where feedback is afforded, it should provide the learner with useful and helpful information. Various options, which you could use under different circumstances, include an overall test score, a specific response indicating whether each question is correct or incorrect, and a specific response giving the correct answer. You might also give the learner a chance to try the questions more than once. You could provide remedial feedback—not giving the correct answer, but pointing the learner to a place to find the correct answer or learn more. Another option is to have the learner's answer to a question reroute his or her path through the course (either in a programmed manner or by his or her choice). In a simulation, feedback is often the result of the learner making the correct decisions. In a gaming environment there are a variety of creative ideas for both positive and corrective feedback.

Learner Assessment

Even if there are no marks being given or scores being kept, performance feedback for the learner is essential. It lets the learner know if he or she has achieved the objectives. You will need to determine whether the mastery of total course content will be evaluated (using a final exam or other means). You will have to decide what the pass, fail, or grading criteria are. Whether scores will be recorded, or reports will be available for learners, instructors, or administrators are other issues that need to be dealt with.

Several types of assessment can be used to measure learning in a web-based course. These include completion (getting through the course), scores on tests, and results in simulations. Some web-based courses may involve communication and work done with others. In that situation, one can also evaluate group participation and effectiveness. Self-assessment can also be a valuable tool. Whatever type of assessment is used, the method of evaluation should be clearly described, and knowledge, skill, or attitude gains should be measured. Moreover, testing should relevant to real world performance objectives, and, in fact, real world problem solving (e.g., scenarios or course projects) can be used.

Section quizzes or other learning checks are often part of learner assessment. Test questions need to be written at an appropriate level. You may want to randomly pick questions from a bank. In addition, a good variety of the various different types of quiz questions should be used (see list below or go to http://www.questionmark.com/us/Learningcafe/ for more information).

- True-false
- Multiple choice

- Multiple answer
- Fill in the blank
- Matching (using drag-and-drop technology)
- Hot spot questions
- Numerical calculations
- Random generation of questions from a pool
- Ranking
- Likert scale selection (see http://www.usabilityfirst.com/glossary/term_968.txl)
- Problem solving
- Short answer
- Performance on a simulation
- Essay (requires someone to be available for marking)

Tools

There are many tools that can be used to author on-line learning courses. The choice of tool should be part of the design. Factors such as how elaborate the course design is; your experience with the various tools; how knowledgeable you are about both the technology and the course design; how much time you want to take to learn a new tool; and the learning content management system (LCMS) that will be used will influence the choice of tool. The following are a few examples of various tools.

- Basic programming of *hypertext markup language* (HTML) pages
- **Adobe/Macromedia Flash** objects
- Web site authoring software, such as **Macromedia Dreamweaver**
- Tools, such as **Articulate** and **Impatica**, which convert documents from **Microsoft PowerPoint** and **Word** formats
- Fully programmable course authoring tools, such as **ToolBook** or **Authorware**
- Easier-to-learn authoring tools, such as **OutStart Trainer** or **Trivantis Lectora**
- Tools available within the LCMS

Technical Issues

Because e-learning courses operate in a technical environment—they must work on your *learning management system* (LMS) or LCMS, and people need easy access to them—there are a number of other technical issues that need to be considered. The following list highlights some areas you might want to take into account.

- Do the learners have the necessary computers and computer skills?
- Can learners access the course easily?
- Have you allowed for reduced bandwidth access to the course where necessary?
- Can people download the course for off-line access?
- Does the course start immediately when accessed? If not, is there a "please wait" message to the learners?
- Is the performance of the program adequate without long delays when making choices or using rich media?
- Does the course include clearly written and jargon-free instructions for accessing and downloading it (if appropriate)?

- Is helpful technical support available over the phone or on-line?
- Is the course compliant with standards, such as *Aviation Industry CBT Committee* (AICC), *Sharable Content Object Reference Model* (SCORM), etc., so that it will work properly with your LMS or LCMS?

Evaluation

Finally, have you provided a way to evaluate the course itself? Learners may appreciate an opportunity to provide feedback via questionnaires, surveys, interviews, etc. In addition, it is important to be able to make changes in the program based on learners' feedback. In this regard, it may pay to keep the following points in mind.

- Have you incorporated performance measures that can be used to benchmark the success of the program or the need for revision?
- Have you designed follow-up surveys, interviews, etc. with employees, colleagues, and managers to assess the on-the-job performance?
- Have you planned for course revisions based on feedback and performance measures?
- Have you incorporated goals for business measures, such as increased sales, reduced error rates, etc.?

For almost fifty years, the bible for the evaluation of training programs has been Donald Kirkpatrick's four levels (Kirkpatrick and Kirkpatrick 1998, see also http://www.questionmark.com/us/Learningcafe/kirkpatrick_4_levels.ppt). The four levels are as follows.

1. Learner reaction and satisfaction. This involves learner feedback as to the quality or effectiveness of the course, usually determined from post-course evaluation questionnaires, surveys, or interviews.
2. Learning. How much has been learned is determined, usually from test performance.
3. Behavior, application, implementation, or performance on the job. Is the learner doing a better job as a result of the training?
4. Results or business impact. Is the company or business unit achieving its objectives more effectively?
5. A fifth level—*return on investment* (ROI)—has been proposed by Jack Phillips (Phillips, 2003).

You can't really go beyond level two directly in a web-based course. The other levels require later follow-up. Nonetheless, they should be planned as part of the course design.

References

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