What Makes Good Web-Based Instruction?

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Effective Web-based instruction (WBI) design contains the same basic elements required for more traditional instructional design. Dewald states that sound pedagogical principles have informed traditional face-to-face library instruction and those same principles should be used to create WBI (Dewald 1999).

WBI is relatively new and as such, developers are still exploring the best design methods. Initially, much WBI was developed with a primary focus on the technology used and little or no thought given to instructional design theories, learning theories, or good pedagogy. However, as this medium for instructional design begins to mature, WBI development should be informed by these areas of study.

"Employing instructional design principles and models in creating WBI can help ensure that what is produced is of high quality and is able to present significant challenges to students. Instructional design is the systematic development of instructional specifications using learning and instructional theory to ensure the quality of instruction." (Moallem 2001)

To understand instructional design models, it becomes necessary to know something of the learning theories that form the bases for these models. "The underlying philosophical views of traditional and constructivist (instruction design) models are objectivist and constructivist theories of knowledge. Objectivists believe that knowledge and truth exist outside the mind of the individual and are therefore, objective. An instructional developer who uses traditional design models analyzes the conditions which bear on the instructional system (such as content, the learner, and the instructional setting) in preparation for achieving the intended learning outcomes. Constructivists, on the other hand, believe that knowledge and truth are constructed by the learner and do not exist outside of his mind (Duffy & Jonassen, 1992). Constructivist instructional developers value collaboration, learner autonomy, generativity, reflectivity and active engagement." (Moallem 2001)

Moallem states that although there is a philosophical debate in the literature between objectivist and constructivist design models, in reality a mix of both are being used. Instructional designers use what works best in a given situation.

Dewald offers another viewpoint. "Behavioral learning theory and cognitive psychology have influenced most modern teaching practices. … Behavioral learning theory focuses on modifying the learner's behavior and produces instruction that involves a presentation of information, a question to elicit a response from the learner, feedback to the learner's response, and either positive reinforcement for a correct answer or a repeat of the cycle to learn correctly. Behavioral learning theory is the basis of traditional learning environments that are geared for efficiently transmitting information and basic skills to students in a well-organized manner….This method is used for much technical training…and it is especially effective for simple well-structured learning." (Dewald 1999)

From the research that is being done on effective WBI, and the application of learning theories and good pedagogy to the development of WBI, it is possible to summarize some of the hallmarks of good WBI. Good Web-based instruction has the following characteristics:

- States clear objectives and prerequisites in learner terms
- Has consistent layout and well-planned navigation

- Is learner-directed
- Employs a non-linear approach
- Is interactive
- Has a source of motivation for learners
- Provides frequent practice and immediate feedback
- Is concise and presents information in small chunks
- Uses a variety of styles to engage different learning styles

Good WBI states clear objectives and prerequisites in learner terms

Informing the learner of the lesson objectives is one of Gagne's nine essential events of instruction (Gagne and et al. 1981). Clearly outlining the objectives of the course is an important aspect of effective WBI. These objectives should be stated in student learning terms as opposed to content coverage (Carr Chellman and Duchastel 2001).

The objectives often become part of navigation schemes for WBI. Dewald recommends displaying objectives in the form of an outline of what one will learn, with directional signs for navigating one's way through the lessons (Dewald 1999a).

Along with objectives, learners should also be presented with clear prerequisites for each segment of the training. One of the strengths of WBI is that it can easily be designed using hyperlinks to allow learners to construct an individualized path through the training. With this type of design, students can move around within the training module and can repeat sections as desired, or can choose the sequence of study within the module. Because of this freedom of movement and flexibility, it becomes even more imperative that objectives and prerequisites for each segment are clearly stated.

Good WBI has consistent layout and design with a well-planned navigation scheme

This requirement is not unique to effective WBI design; rather, it is a requirement for good Web site design in general. Janicki, Schell et al. discuss consistent layout design as a major consideration in effective Web design (Janicki, Schell et al. 2002). Moallem provides more details in his encouragement of consistency:

- Plan for consistency in layout and presentation.
- Plan for consistency in font type and size and in the use of underlining, bold letters, and italics. Limit the number of variations and use them only for pre-determined reason.
- Remain consistent in the use of technical language – don't use several synonyms (e.g. OPAC, online catalog, PAC, etc.) (Moallem 2001).

Navigation is a tremendous issue in the success of a Web sites in general and WBI modules in particular. The site's navigation scheme should be obvious, redundant and consistently presented. The requirement for a navigation scheme to be obvious means that it is easily understood and its components are easily spotted on the screen. Menus, buttons, and icons can all be used as navigational components. Redundancy and variety of style are achieved by providing more than one methods for the learner to navigate the site. These methods might include a graphic menu at the top or side of the screen along with a duplicate but text-based menu at the bottom of each screen. Or it might mean a combination of a menu along with buttons labeled "Next", "Back" or "Main menu" which will move the user forward or backward one screen or allow the user to return to a main menu or central navigation point.

Consistent and effective use of navigation as well as color, fonts, and other styles can play a large role in helping learners intuitively understand and exploit the nature and structure of the training.

Good WBI employs a learner-directed, non-linear approach

Non-linear, customized access to material is the very hallmark of the Web environment. Using hyperlinks and strong consistent navigational layouts, WBI designers can allow learners to move through the lesson(s) in a self-directed way. This is especially important for adult learners. Knowles wrote of adult learning theory, or andragogy. He felt that learner-centered education is especially suited to adults as it assumes that the learner prefers to be self-directed (Knowles 1980), (Dewald 1999).

Gagne et al. (Gagne and et al. 1981) also listed allowing the user to control the pace of the lesson as their first "tip" for a good computer assisted instruction (CAI) lesson (precursor to WBI). Among the effective Web design features outlined by Janicki, Schell, et al. (Janicki, Schell et al. 2002) is to use a non-linear approach to lessons. (Molina 1995)

Good WBI is interactive

Brandon Hall (Hall 1997) states that interactivity is what distinguishes an information source from a learning experience. Good WBI can employ interactivity in a number of ways, including quizzes, exercises, and feedback forms. Hall writes that all Web-based training should be interactive, because 'interactivity makes the difference between a program that simply presents information, and one that actually trains the user'. Interactivity …engages the learner with the material in order to practice skills." (Dewald 1999b).

Learners need frequent practice with immediate feedback of results. Dupuis states that reports about undergraduate education emphasize the need for students to learn how to define a question and solve problems (Dupuis 1998). Memorization is adequate for simple information. But for more complex knowledge, researchers in WBI prefer application of the knowledge to a task to ensure deeper learning. Active learning engages students in the learning process to create their own understanding of the subject matter (Dewald 1999b).

Good WBI has a source of motivation for learners

Nipp encourages WBI designers to use working that motivates the student to move forward, specifically keeping in mind student goals (assignments) (Nipp 1998). Other authors recommend that library WBI be conducted in conjunction with other courses as part of an assignment for the other course. According to Knowles, adult learners are most ready to learn when they have a real-life need to know something (Knowles 1980). Among undergraduate adult learners, this real-life "need to know something" often translates to an assignment. Dewald also makes the point that Web-based library tutorials are best used in connection with academic classes rather than in isolation (Dewald 1999a). In other words, when students have an assignment to do and must use the Web-based training module to fulfill that assignment, the training offered has a greater chance of gaining their attention and being absorbed. This correlates with the behaviorist view of instruction which maintains that extrinsic motivation is an important factor in learning theory.

Good WBI provides frequent practice and immediate feedback

Learners need to be able to test new knowledge and practice new skills in order to assimilate these new bits of knowledge and skill. Quizzes, exercises, and feedback forms can all be used to provide practice and help the librarian monitor learning success. The system should provide students with immediate feedback on the success or failure of their efforts and ideally, should provide new opportunities for practice and exploration as needed.

Good WBI is concise and presents information in small chunks

Generally, there is nothing more deadly to learner enthusiasm for WBI than long pages of text. A well-designed Web-based instruction module should use the fewest words possible to teach each instructional objective (Moallem 2001). Moallem also recommends short sentences, plenty of white space on the screen, and the use of charts or diagrams which can be effective tools for reducing the number of words needed to explain a concept. Tobin and Kesselman have similar recommendations:

- Pages should be concise and not read like a book
- Break large pages into discreet segments
- The training itself should address a specific and fairly narrow topic (Tobin and Kesselman 1999)

Dewald recommends creating modules that provide information in small blocks, breaking it up into parts and subparts with summaries and reviews This helps learners absorb material gradually, organize the material in their own minds, and allows for frequent practice questions and feedback (Dewald 1999a).

In their tips for a good computer aided instruction lesson, Gagne et al. had three recommendations which included advice about avoiding excess text:

1. Let the user control the pace of the lesson;
2. Avoid too much text on a screen; and
3. Provide instructions on what to do next. (Gagne and et al. 1981).

Dupuis advises WBI designers to challenge what learners need to know. "We have a limited amount of time with students; think seriously about what is most important to convey." (Dupuis 1998).

Good WBI uses a variety of media styles and presentation techniques to maintain interest and appeal to different learning styles

Dupuis recommends blending entertainment with education. Gaining the learner's attention is one of the nine essential events of instruction described by Gagne et al. (Gagne and et al. 1981) in their article *Planning and Authoring Computer-Assisted Instruction Lessons*. Good WBI must capture and hold learners' attention in order to be effective. A variety of media styles (text, graphics, video, and audio) and presentation techniques helps maintain student interest and engagement. Another bonus is that varied presentation techniques, in addition to making the presentation more interesting, also appeals to a variety of learning styles (Dupuis 1998).

Summary

In summary, good Web-based instruction design follows many of the same principles of more traditional instructional design. WBI designers may draw from a number of learning theories and instructional design theories in order to find the most effective Web-based presentation. What is important is that designers of WBI for adult learners keep in mind the needs of adult learners, use the principles of strong instructional design, and use the characteristics of the Web environment to best advantage. These characteristics include flexibility of navigation which provides the opportunity for learner-directed training, the use of a variety of presentation styles and media (including audio, video, text, and graphics), high levels of interactivity and learner engagement, and appropriate and immediate feedback to learners.

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