
New Media



Introduction to Advanced Web Page Design and Web-Based Interactivity (Medical Education Web Page Series - Part 5)

In earlier discussions in this series we explored differences between “content-focused” Web pages and “form- focused” Web pages. It was noted that the former are simple in format (often just pure text), while the latter have a number of more advanced Web page elements such as images, hypertext links or even audio and video clips. The art of good Web page design, it was also noted, is to present information in a logical and easily navigated format, with the appropriate use of graphical images and other adjuncts. Still, this is a matter best learned from specific examples. My recommendation here is to visit <http://www.web-pagethatsuck.com>, an excellent but provocative site by Vincent Flanders, a Web design expert known for his stinging commentaries. By avoiding the mistakes he identifies you will be well on your way to implementing good Web page designs.

One concept that particularly distinguishes “form-focused” Web pages from “content-focused” Web pages is “interactivity”. Although this term appears to be frequently overused and often poorly understood, the notion of interactivity remains an important and useful pedagogical concept, and is especially topical to Web-based education given the introduction of new technologies (such as JavaScript Web programming) designed specifically to support advanced user interactivity.

Interactivity in Education

In his book *Understanding Interactivity*, Crawford¹ discusses the notion of interactivity in terms of a conversation: “a cyclic process in which two actors alternately listen, think, and speak” and notes that the “quality of the interaction depends on the quality of each of the subtasks (listening, thinking, and speaking)”. This model of interactivity avoids some of the

pitfalls associated with some definitions offered in the past. Notes Crawford:

...consider this definition of interactivity offered in a popular book: “By definition, the things people do on computers have always been interactive. “Not very illuminating, is it? Or here’s another definition offered on a Website: “Interactivity ... concerns itself with the various means by which human beings implement actions.” Rather mushy, eh? So let’s start with a humbling realization: we really don’t have a clear idea of what interactivity is all about. Plenty of people have slapped it onto their work and tried to sell “The Same Old Same Old Stuff” as “New Interactive Technology!” and we have to admit that, with all the hype, we’ve lost track of the true meaning of the word.

Educators, especially those focusing on distance education, place considerable importance on the notion of interactivity. Well-designed interactivity in educational systems can (at least in principle) help capture the learner’s interest, has the potential to speed the learning process, and even allows for continuous assessment of the degree to which the material is mastered. Technology (at least theoretically) can allow for high-quality interactivity by providing for frequent and relevant user feedback, by recognizing when students misunderstand a concept, and by providing learning aids such as animations or graphs that vary depending on user input.

One simple definition of “distance education” is that it is the delivery of instruction that does not require the student to be present in the same physical location as the instructor. What then is “interaction” in distance education? I would suggest that interactivity in education is a generic term covering all manner of notions of amplification, appraisal, clarification, commentary, communication, exploration, feedback, involvement and participation in the context of an educational exercise. In more concrete terms, interactivity in the distance education setting may be based on, or supported by, communication technologies such as the telephone, e-mail, instant messaging (e.g.,

ICQ), or computer conferencing, as well using other technologies such as computer-based simulation or Web-based techniques.

Why is interactivity important in education? One reason is that interactivity is particularly compatible with established psychological models of learning and the central tenets of adult learning theory.² In particular, constructivist principles help account for the importance of interactivity in distance education. (Constructivism is the view that knowledge is “constructed” by the learner by testing ideas, concepts and approaches based on existing knowledge and one’s actively acquired experiences, and that knowledge is not merely acquired passively. Constructivist theory holds that students learn best when students actively participate in problem-solving and critical thinking while involved in an appropriately formulated learning activity, and that this learning involves the integration of newly acquired knowledge with pre-existing intellectual constructs. For a Website offering extensive discussions on constructivism see <http://curriculum.calstatela.edu/faculty/psparks/theorists/501const.htm>).

Experts in adult learning also argue that traditional didactic teaching merely encourages passive learning, instead of the development of higher order cognitive skills needed for true education. They point out that active involvement is essential for effective learning, and adults learn best, they argue, when one can draw on previous experience, using techniques such as group discussion, simulation exercises, and problem solving. That is, going beyond mere looking and listening motivates people to learn on their own, gives students the motivation to try out new ideas, and encourages them to critically examine issues that were once simple accepted passively.

The Royal College of Physicians and Surgeons of Canada (RCPSC) has long taken an active role in the post certification education of Canadian specialists through their Maintenance of Certification (MOC) program and its forerunners. This program requires that members complete 400 credit hours of acceptable Continuing Professional Development activities (CPD) in a five-year period to maintain specialist certification. Among the most popular means of collecting credit is through “Section 1” educational activities (attending lectures, seminars, scientific meetings, journal clubs, etc.). The RCPSC feels strongly that Section 1 activities are of increased educational value where there is an opportunity for interaction between the “expert” speaker and the participants. This is often in the form of a question and discussion period that serves to further engage the listener as well as to clarify some of the issues that may remain unanswered at

TABLE I Design pitfalls to avoid in Web page design

Modified from
<http://romantech.co.uk/rebuild.htm?l=/menu2.htm&r=/design101/article2.htm>

- 1 Backgrounds should enhance a site, but backgrounds that distract or make the text too hard to read should be avoided.
- 2 Text should be readable. Text that is too small, badly coloured, closely aligned against the left edge of the screen, or text that stretches across the full page can be hard to read.
- 3 Bad use of text formatting distracts readers. Paragraphs that are all bold, all capitals, all italic can be annoying to read. Underlined text that is not a hyperlink only serves to confuse.
- 4 Hyperlinks need to be obvious, but blue link borders around images simply look unprofessional. (But these are nothing compared to the frustration caused by dead links!).
- 5 Graphics can make or break a site, but avoid large files that take forever to load. Similarly, avoid graphics that do not fit on the screen in 640 x 480 mode.
- 6 Only use table borders if they are actually required.
- 7 Avoid anything that blinks.
- 8 Don’t bother with “under construction” signs; if a section is not ready, then there is no point in having a link to it.
- 9 Avoid pointless bits and pieces such as counters, advertising, or pictures of meaningless awards.
- 10 Avoid bad or unclear navigation.

TABLE II Some interactivity tools for a limited budget

Modified from <http://www.contentious.com/articles/001105-1.htm>

- 1 eGroups: free discussion and announcement e-mail lists. (<http://groups.yahoo.com>)
- 2 Zoomerang: free online survey tool. (<http://www.zoomerang.com>)
- 3 Ultimate Bulletin Board: a fairly inexpensive Web-based message board tool, from Infopop. (<http://www.infopop.com>)
- 4 Uptilt (<http://www.uptilt.com>) and Bravenet (<http://www.bravenet.com>) offer several inexpensive interactivity tools.

the end of the formal part of the presentation.

The MOC program requires that “at least 25% of the time of a CPD event should be allocated for interactive learning.” Otherwise, the program coordinators believe, the event takes place at the expense of audience involvement, a key ingredient in learning. This view is supported by a landmark meta-analysis of the effectiveness of formal Continuing Medical Education by Davis *et al.*³ who showed that traditional didactic methods do not generally lead to a change of clinical practice, or to an improvement in patients’ health outcomes, whereas interactive techniques are more likely to.

It was noted in earlier articles that Web pages are built primarily using HTML. There are many advantages to

using HTML, the first of which is that you do not need to buy any special software in order to use it; one can write Web pages in HTML using almost any text editor. (Still, most people prefer to use a visual HTML editor, and there are a number of inexpensive or free HTML editors available, as discussed earlier in this series.) Table I lists some of the more common design pitfalls to avoid in Web page design when using HTML.

However, despite the many good properties of HTML, there are a number of drawbacks to using it as the only type of Web page language. The first is its limited interactivity. One way of providing extra interactivity by using a concept referred to as "Dynamic HTML" (or DHTML), which supports features such as Cascading Style Sheets, a capability which allows one to provide page layout features (for example, font type, font size, font color, etc.) to be attached to the structural portions of your HTML document (e.g., headings, subheadings, paragraphs, unvisited links, etc.). A number of other inexpensive or free interactivity tools are listed in Table II.

Web-based interactivity can be implemented in various ways. For instance, a section of a Web page may ask the student a question, and offer four possible answers the student may click on. Depending on the student's response, the Web page can provide a different commentary. Other forms of Web-based interactivity may involve the use of discussion forums or online surveys and polls. Providing e-mail addresses (and "mailto" links) for authors or instructors can also help make material more interactive. Advanced interactivity may also be achieved using JavaScript, a popular and relatively easy to learn programming language for Web pages that will be discussed later in this series.

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References

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- 2 *Simpson RJ, Galbo JJ*. Interaction and learning: theorizing on the art of teaching. *Interchange* 1986; 17: 37-51.
- 3 *Davis D, O'Brien MA, Freemantle N, Wolf FM, Mazmanian P, Taylor-Vaisey A*. Impact of formal continuing medical education: do conferences, workshops, rounds, and other traditional continuing education activities change physician behavior or health care outcomes? *JAMA* 1999; 282: 867-74.

Erratum

In the article entitled: "Prevention: intraoperative neuraxial blockade reduces some postoperative complications" – Regional anesthesia and pain – Best evidence in anesthetic practice, published in the November 2001 issue, *Can J Anesth* 2001; 48: 990-2, the article appraised should have read: "*Rodgers A, Walker N, Schug S, et al*. Reduction of postoperative mortality and morbidity with epidural or spinal anaesthesia: results from overview of randomised trials. *BMJ* 2000; 321: 1493-7.