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ABSTRACT

To many educators, Web-based training (WBT) is the constructivist ideal--learners can construct meaning through self-directed inquiry, guided activity, and group collaboration on the information highway, the digital library, cyberspace, or the global village. Although research on the effectiveness of WBT as a vehicle for constructivist learning is scanty, findings from other areas can be applied. For example, WBT provides full, rich information from innumerable sources, can accommodate differences among learners, allows learning activities that foster construction of meaning, and helps instructors make the change from giver of knowledge to guide, facilitator, and coach. Although the technology of WBT allows, enables, and promotes constructivist learning, WBT does not always deliver in practice. Reasons include: that some learners need new technology skills, some instructors have difficulty incorporating WBT into their teaching, some instructors find it difficult to function as a guide, and the amount of information available can be overwhelming or be out of date. Considering advantages and disadvantages, one could conclude that although enormous amounts of information can be available on the Web, it is not always accessible or usable. In addition, although WBT has the capability needed for allowing learners to construct meaningful learning, it is not always used, and it may not always be appropriate. Implications for policy and practice show that instructional design, not merely technology for its own sake, should drive the use of WBT and that learners and instructors need appropriate training to take advantage of this approach. (Contains 18 references.) (KC)

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Web-Based Training and Constructivism

To many educators, web-based training (WBT) is the constructivist ideal—learners can construct meaning through self-directed inquiry, guided activity, and group collaboration on the information highway, the digital library, cyberspace, the global village. But is this vision of WBT as the constructivist ideal real or illusory (Wilson and Lowry in press)?

What Is WBT?

Although experts may disagree on technical issues, WBT can include almost any kind of training provided through a network of computers (Driscoll 1999). Web computer-based training (CBT) is similar to CBT delivered via CD-ROM. In electronic performance support systems (EPSSs), online job aids and tools provide information to help workers solve specific problems. Virtual asynchronous classrooms link users online at different times with communication tools like e-mail, online forums, bulletin boards, and listservs. In virtual synchronous classrooms, all users are online at the same time using audioconferencing, videoconferencing, chat rooms, and shared applications.

What Is Constructivism?

Constructivism, a theory of learning, holds that learners actively construct meaning by interacting with their environment and incorporating new information into their existing knowledge. Interaction and cooperation—key elements—allow motivation, support, modeling, and coaching (Feden 1994).

Constructivist theory has important implications for both learning and teaching (Brown 1998). Activities should be active, self-directed, learner centered, and collaborative. Information should be available in a variety of media and sequences to accommodate differences in modality, cognitive styles, and multiple intelligences. The instructor becomes a guide, facilitator, and coach instead of a transmitter of knowledge.

So, How Well Do They Fit?

The career and technical education literature shows scant research on the effectiveness of WBT as a vehicle for constructivist learning, but findings from other areas can be applied.

Full, rich information. The very nature of WBT provides access to an incredible amount and variety of information:

- Trainers can provide any information that can be captured in a computer file—theory, examples, exercises, and tools that learners can use (Giroux et al. 1997).
- The Web itself has so much information that no one even knows how much there is, what there is, or how fast it's growing.
- Communication tools (e-mail, listservs, bulletin boards, newsgroups) allow learners to seek, contribute, exchange, discuss, and debate additional information (Kilby 1999).

Differences among learners. The technological capabilities built into WBT can make information available in different ways to suit different learners:

- Information can be presented in almost any modality or combination of modalities—text, still graphics, animation, audio, or video (D'Halluin et al. 1996).
- Multiple intelligences can be accommodated by a wide array of software, multimedia, and other technologies (Johnson 1998).
- In the nonlinear information landscape (Jin and Willis 1998), learners can use hyperlinks to access information in a self-directed sequence appropriate to their cognitive style.

Learning activities. The technology of WBT allows learning activities that foster construction of meaning:

- Communication tools allow interactive one-to-one or many-to-many exchanges of information—the building blocks of meaning—independent of time and place (Burge 1994).
- Those tools also allow learners to manage the learning environment, the group process, and their roles (Eastmond 1998).
- Asynchronous communication can allow more time for thoughtful reflection and

participation by more learners (Parker and Rossner-Merrill 1998) and reduce the inhibitions sometimes felt in the face-to-face classroom (Black 1997).

The instructor as guide, facilitator, and coach. The technology of WBT can help instructors make the change from Sage on the Stage to Guide on the Side:

- Communication tools allow instructors to provide ad hoc guidance, advice, coaching, and feedback as learners construct meaning (Wilson and Lowry in press).
- Instructors can use hyperlinks, image maps, and threaded conferencing themes (Kilby 1999) to provide scaffolding to guide learners in constructing meaning.
- Multimedia technology can engage learners and enliven learning through small group discussions, role-playing, learner presentations, brainstorming, simulations—all online (Eastmond 1998).

Thorns on the rose? Although the technology of WBT *allows, enables, and promotes* constructivist learning, WBT does not always deliver in practice:

- Some learners need new technology skills before they can begin constructing meaning (Eastmond 1998).
- Some instructors have difficulty incorporating WBT technology into their teaching (Schneiderman et al. 1998).
- Some instructors find it difficult to be the Guide on the Side (Bednar and Charles 1999).
- Not all learners have the goals, interests, navigational skills, metacognitive skills, and prior knowledge of subject matter necessary to learn effectively in WBT (Tergan 1997).
- High-quality, interactive, multimedia, and nonlinear but scaffolded material is expensive (Giroux et al. 1997).
- The sheer magnitude of the Web can magnify problems found in any information system—disorientation, navigation, and information overload (Brandt 1997).
- Information on the Web may be unreliable, out of date, chaotic, or unavailable; technology can be slow and balky (Wilson and Lowry in press).
- Many websites contain nothing but unadorned text—no rich, nonlinear information landscape; no interactivity; no multimedia; no hyperlinks.

• The constructivist capabilities of WBT can be wasted in areas where memorization and rote learning may in fact be more appropriate (Airasian and Walsh 1997).

Some Conclusions

Considering advantages and disadvantages, strengths and shortcomings, capabilities and cautions, we can draw some conclusions:

- Enormous amounts of information can be *available* on the Web and in custom WBT training materials.
- However, available information is not always *accessible*. Learners may lack the search skills necessary to find it.
- Available information is not always *usable*. Learners may lack scaffolding to connect it to their knowledge, group and communication skills to process it, or metacognitive skills to construct meaning with it; and the information itself may be of little value.
- The Web's versatile mix of software, media, and technology has all the *capability* needed for the interaction and collaboration among learners, their environment, and their instructors that constructing meaning requires.
- The capability for interaction and collaboration is *not always used*. Learners can encounter screen after screen of text without a single nonlinear hyperlink or alternative multimedia presentation; conferencing can go on and on with a single organizing thread as scaffolding; one-to-one, one-to-many, and many-to-many communication may be used only rarely or ineffectively.
- The built-in potential and capabilities of WBT for constructivism are not always *appropriate* for every learning task. Sometimes it may be more appropriate to transmit knowledge than to have learners construct meaning.
- The Guide on the Side is more than just a catchy phrase—it's a role that instructors *must actually play*, from the first step in planning to the final step in execution, in order to realize the potential of WBT for constructivist learning.

Implications

Clear implications emerge for policy and practice:

- Sound instructional design should drive the use of WBT—not the appeal of technology for its own sake. Learning tasks should require constructing meaning rather than transmitting knowledge.

- Instructional planning should identify and provide appropriate scaffolding, advance organizers, hyperlinks, and multimedia for constructing meaning.
- Learners should receive training necessary to make effective use of any technology involved in WBT.
- Instructors should receive appropriate information and guidance to ensure that they act as the Guide on the Side, not the Sage on the Stage.

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