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The effect of learning styles on the navigation needs of Web-based learners

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Abstract

Web-based training with all its potential benefits is growing at a tremendous rate; however most current systems provide a "one-size-fits-all" approach to the delivery of the material. Two approaches that try to improve end-user learning have emerged: adaptation of the material content and/or adaptation of the material presentation mode. As a subset of the material presentation approach, two modes have been discussed in the literature: learner control vs. system control. It has been discussed that if the amount of learning is dependent on the material presentation mode and the learning style of the users, more effective systems that adapt to this relationship could be developed.

This paper analyzes the results of an exploratory experiment completed by 58 subjects. It first measured their learning style preferences (using a version of the Kolb Learning Style Inventory Tool) and compared it to their actual visits of linked Web-pages. The study found that learners classified as "Explorers" tended to "jump" more and created their own path of learning (learner control), while subjects classified as "Observers" tended to follow the suggested path by clicking on the "Next" button (system control). In addition, test scores for explorers who did jump were higher than explorers who did not jump, while conversely observers who did not jump scored higher than observers who did jump.
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1. Introduction

Computer-based training (CBT) and its newer complement Web-based training (WBT) are growing rapidly. Academicians are placing more and more course material on-line to supplement their tradition in-class instructions. However, course management tools like BlackBoard™ and Web-CT™ as well as authoring tools like Authorware and Director provide only a general 'one-size-fits-all' approach and do not take into account the needs of different learners (Janicki & Liegle, 2001), which could be a reason for the lack of success of many of these systems (Martinson & Schindler, 1995).

1.1. Customizing learning modules to improve learning outcome

It has been argued that by customizing learning modules to differing types of learners, the learning outcome will be increased. Early experiments by Tennyson and Christensen (1988) with their MAIS (Minnesota Adaptive Instructional System) examined among other things the effect of adaptive interface on cognitive strategies of the learner in order to improve learning. Many have built on this research stream. Two approaches that try to improve end-user training have emerged in the area of software training research: (1) adaptation of the training material *content* to match the needs of individual learners and (2) adaptation of the training material *presentation* mode in terms of order and style of the presentation (Olfman & Mandviwalla, 1994).

Further examining the second mode of adaptation (presentation), Bernstein (1998) reported that two different pedagogical approaches to lesson sequencing – the order and style of presentation – may work well on the Web. These pedagogical approaches are based on the behaviorist learning/teaching style and the constructivist theory (Bernstein, 1998; Brandt, 1997) and are commonly referred to as *system control* vs. *learner control* (Aleven & Koedinger, 2001). System control guides a student through predefined steps while learner control provides the navigational tools that permit learners to construct knowledge themselves. A variation of the learner-controlled approach in recent studies involving computer-delivered instruction has been to allow each learner to add or delete elements of instruction at frequent choice points as he or she works through the instructional materials (Schnackenberg, Sullivan, Leader, & Jones, 1998).

The literature has not yet clearly defined which mode is superior. An overview of the research concerning learner vs. system-control was presented by Schnackenberg et al. (1998). They reported that some arguments in favor of learner-control are that: (1) learners best know their own instructional needs, (2) learner-control can help students become independent learners, and (3) learners construct their own knowledge in the context of their own needs and experiences and require control over the learning process to do so.

Critics claim that learner-control distracts learners because it forces them to interrupt their learning and pay attention to the sequencing of material. They claim that beginners are unable to make the right sequence choices: ''students cannot be expected to select learning tasks and topics efficiently in domains they are just beginning to learn about'' (Murray, 1998), or simply suffer from disorientation (Chalmers, 2003). Different learning strategies might further influence the use of navigation (Namlu, 2003). This view is supported by Lieberman and Linn (1991) who reviewed the literature of learner vs. system-control and found that novices should benefit from system-control, but more advanced students could benefit from learner-control. Others go even further claiming that the