

Interactivity and Web-Based Courseware

Introduction

Interaction or interactivity refers to how different components in a learning environment can act and react with one another to facilitate learning. This becomes especially important in distance learning environments and web-based courseware where the learners, instructors, and content are often separated from one another in terms of both distance and time. This paper examines the concept of interactivity and how it can be enabled in web-based courseware.

Definition of Interactivity

The American Heritage Dictionary (2000) defines *interact* as a verb that means “to act on each other.” *Activity* is defined as “the state of being active.” *Interactivity*, then, can be defined as a state in which two or more entities act on one another. In a learning context, then, interactivity refers to how the different components in a learning environment act upon each other to facilitate learning.

Implicit in the definition of interactivity is the concept of active learning. Active learning is not a new concept. It can be seen in the philosophy of Socrates with its emphasis on the process of learning, questioning, and reasoning, and the theories of John Dewey with his emphasis on the importance of learning through activities and experience.

Interactivity is also a component of all three major epistemological traditions – objectivism, pragmatism, and interpretivism. Objectivism assumes that reality is external to the learner and that knowledge is absolute and acquired through experience. Interpretivism assumes that reality is constructed by the learner and knowledge is relative to the individual learner as he or she finds meaning in what has been experienced. Pragmatism assumes that reality is interpreted and knowledge comes from both experience and reason (Driscoll, 2000). One’s epistemological beliefs will influence the types of interactivity provided in any instructional experience. For those with an objectivist’s point-of-view, interaction will tend to be more traditional, with the students being more on the receiving end of the interaction with their teachers and their textbooks. For those with an interpretivist’s point-of-view, the emphasis will be on what the student constructs from interaction through group discussions, group problem-solving, and reflection on course materials. A pragmatist, on the other hand, may combine lectures with classroom discussion and experiential learning in the belief that all are useful in acquiring knowledge.

Interactivity is key in the major learning theories as well. Behaviorism, with its emphasis on conditioning and reinforcement, relies on interaction between the learner and the teacher or the learner and the environment for the stimuli that either strengthens or weakens the responses from the learner. Cognitivism focuses on the mental activity that occurs as inputs received from the senses are transformed into knowledge that the learner can use. Even though the focus is on the mental processes, the inputs received are a form of interactivity as is the transfer of knowledge to a real-world situation. Constructivist theory maintains that learning is an active process in which a knowledge base is built up by relating new information and experiences to the learner’s current or pre-existing knowledge base. The new information and experiences come from the learner’s interaction with the learning environment.

Interactivity, then, is the active and observable component in any teaching and learning situation. While interactivity may occur in all types of learning environments, Moore and Kearsley (1996) defined three types of interaction important in a distance learning environment: learner-content, learner-instructor, and learner-learner. Learner-content interaction has traditionally been defined as the learner's interaction with the subject matter. I would expand Moore's definition to include not just the content or subject matter, but also include interaction with computer- or web-based tools and resources. Similarly, the use of the computers and the web for distance learning also expands the definition of learner-instructor interaction. Moore referred primarily to ways a learner could interact with the teacher. My definition would include other experts including human experts who could be contacted through email or computer conferencing, and various computer-based experts including expert system, intelligent tutors, and pedagogical agents. These ideas will be expanded in the next section of this paper.

Note, however, that not all types of interactivity are required or possible in a distance or web-based learning environment. For example, in a paced, cohort-based course, learner-learner interaction may be possible, but in a self-paced, independent study course it may not be. Learner-instructor interaction may take place in both paced and self-paced courses, but may not exist in a web-based tutorial. Learner-content interaction, however, is present in most web-based learning environments.

Enabling Interactivity in Web-Based Courseware

As described earlier, interactivity is key in any teaching and learning situation. Because of the separation of learners and instructors in a distance learning environment, it becomes even more important when designing and developing web-based courseware. In this context, the term *courseware* refers to the computer-based tools, resources, and content designed to facilitate web-based learning. Web-based courseware is more than web-based content, much in the same way a face-to-face class is more than just a textbook and materials. Web-based courseware is more than just a new presentation or delivery mechanism for content. It must encourage participation and active learning by the students through interactivity.

For the first type of interactivity, learner-content, web-based courseware must adhere to the principles of good multimedia and web page design. Clark and Mayer (2003) elaborate on many of these principles which include using words, graphics, and audio to effectively present information, all based on empirical research on how people learn. For example, the addition of a picture or diagram to illustrate a concept will do more to facilitate learning than just a text description alone. But many of these principles hold true whether the information is in a textbook or web-based.

To take advantage of the potential that the Internet offers, web-based courseware must be more than just the presentation of information. If hyperlinks are used effectively, for example, web-based courseware can allow learning to be more self-directed, giving the learner more control over the sequence of instruction. Care must be taken, however, that guidance is still provided by the courseware to help prevent the learner from getting "lost in cyberspace." A good example of how interactivity between the learner and content can be encouraged through the use of hyperlinks is by using a WebQuest, "an inquiry-oriented activity in which some or all of the information that learners interact with comes from resources on the internet, optionally supplemented with videoconferencing" (Dodge, 1995). In addition, both client-side and server-side technologies such as Javascript, CGI-BIN programs, servlets, and active server pages can be

used to enhance interactivity by allowing the web content to be presented dynamically, dependent on learner's actions and responses.

Learner-instructor interaction in web-based courseware can be facilitated through the use of email, discussion boards, online chats, instant messaging, voice over IP, and virtual classrooms. These technologies allow students and teachers (or other human experts) to interact, allowing information and feedback to flow bi-directionally. In cases where a human instructor or expert is not present, the computer can be a surrogate expert which interacts with the student. Clark and Mayer call this "personalization" in which a conversational writing style can be used to encourage learning or in which a pedagogical agent coach plays the role typically filled by a human instructor. These pedagogical agents can use artificial intelligence techniques to adapt their behavior in an online learning environment, interacting and collaborating with students to both engage and motivate them (PALS, 2004).

Learner-learner interaction can be facilitated in a web-based learning environment much in the same way learner-instructor interaction is. A difference with learner-learner interaction, in my opinion, is that the courseware must be designed to facilitate that interaction. Students are more accustomed to interacting with their instructors and with course content than they are with other learners. But learner-learner interaction can often be one of the most valuable types of interaction, especially in courses that involve adult learners who bring a wealth of personal experience and knowledge to the learning environment. Team projects, debates, small-group activities, requirements to post and respond to other postings on a discussion board, and chats used for discussion and brainstorming are all instructional components that can be used in web-based courseware to ensure learner-learner interaction.

Conclusion

This paper has only touched on interactivity and its importance in web-based courseware. Interactivity is important for active learning to take place, whether in a traditional, face-to-face classroom setting or in a distance-learning environment. Web-based courseware offers many tools and technologies that can enable learner-content, learner-instructor, and learner-learner interactions. But it is important that sound pedagogical and andragogical principles be applied in the judicious use of that technology to ensure effective instruction that uses the available types of interactivity in a way that facilitates learning.

References

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