

# Chapter 1

## Interactivity Design in E-Learning: An Integrated Approach

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### ABSTRACT

*Learning is becoming increasingly interactive as e-learning continues its growth. Technology advancement not only opens up more affordances for interactivity but also changes the ways people interact with the media and with one another through the media. This chapter attempts to identify key factors that contribute to effective interactivity in the e-learning environment and put the key factors in related perspectives for a holistic view of the interrelations. The key factors include media attributes, instructional values of visuals, audio, and video, digital text and e-reading, accessibility, distributed cognition, system adaptation, virtual space, and collaborative learning. From the interrelated perspective, an integrated approach is proposed for exploring and advancing research and practice in designing and promoting interactivity in the e-learning environment.*

### INTRODUCTION

A great amount of literature can be found on typologizing interactivity. However, the concept of interactivity remains diverse and elusive due to divergent approaches from different perspec-

tives. In mass communication and information science, interactivity is often examined from a technological perspective with a focus on media attributes (Johnson, Bruner, & Kumar, 2006), or from a functional perspective with a focus on system affordances (Sims, 1997; Sundar, 2004), or user control (Jensen, 1998, 2008). In the psychological field from a learner-centered perspective,

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interactivity is generally seen as a process-related construct (Stromer-Galley, 2004), rather than a characteristic of a medium (Rafaeli, 1988; Rafaeli & Sudweeks, 1998). The learner-centered approach is interested in internal cognition processes and instructional strategies to facilitate cognition (Hannafin, 1989; Jonassen, 1985, 1988). Stromer-Galley (2004) distinguishes between the media-centered and learner-centered perspectives by describing the former as product-oriented and the latter as process-oriented interactivity. The latter may involve person-to-person information exchange through media, or interpersonal interactivity (Massey & Levy, 1999).

While the media may have the potential to engage the learner, this potential is released only when the learner interacts with the media or through the media with other learners (Kennedy, 2004). From this perspective, interactivity is seen as a media's potential capability to let the user influence or modify the content and form of the mediated communication or as a measure of control over the communication process by both the sender and receiver (Jensen, 1998, 2008; Neuman, 1991; Steuer, 1995). Rogers and Scaife (1998) suggested that interactivity refers to perceptual and cognitive processes that occur when external representations are used, adapted, or constructed by the user in a given learning activity. In this view, the potential of interactivity is contingent upon the perception, cognition, and reaction of the human communicant. Interactivity is seen not as a function of the affordances of the learning system alone, or merely a function of the cognitive activities of the learner; it is seen as a dynamic process that involves both (Bucy, 2004b; Newhagen, 2004; Domagk, Schwartz, & Plass, 2010). As Stromer-Galley (2004) put it, product and process can interact reciprocally.

This chapter defines interactivity as information exchange between person and media, and information exchange between persons through media. Face-to-face interpersonal interaction without the use of media is excluded from this

concept of interactivity. The process of interactivity involves the following phenomena:

- The sender of a message selects a medium or a combination of media to represent the message.
- The message is encoded and delivered to the receiver.
- The receiver decodes the message and responds to the sender.
- When the receiver responds to the sender, the receiver becomes the sender and the previous sender becomes the new receiver. This reciprocity can continue.

In the process above, both the sender and receiver can be persons or one is a person and the other is a media agent or learning system. The line between person-to-person interactivity and person-media interactivity can often be shifting and easily crossed in today's hypermedia and mobile computing environments. For instance, while most of the interactivity on a web page may be person-media, a chat or mail to link in a web page provides immediate access for a user to start a live conversation with or send an e-mail to a support person.

As mobile computing and networked resources continue expanding, e-learning is expected to become increasingly interactive and flexible. Technology advancement not only opens up more affordances for interactivity but also changes the ways people interact with the media and with one another through media. This chapter attempts to take a new approach to the study and design of interactivity by integrating the study of media attributes and technology affordance with distributed cognition and social interactions. Broadly speaking, e-learning includes any learning activities that employ electronic technology such as computer, digital media, and network resources to enable learning. In this chapter, e-learning primarily refers to learning enabled through the Internet and World Wide Web. However, e-learning can

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