

# Status and Future Trends of Multimedia Interactivity on the Web

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## INTRODUCTION

This chapter provides a brief overview of Web interactivity. It highlights current research findings on interactivity from several academic disciplines and offers insights on current and future development of Web interactivity. A framework to examine multimedia and Web interactivity is provided. The chapter concludes with future trends and suggestions for future research directions.

## BACKGROUND

Interactivity on the Web (or Web interactivity) is a powerful trait that offers enhanced values between merchants and consumers. Studies show that Web interactivity offers better consumer experience, enhances perception on telepresence, and the user's attitude towards a Web site (Coyle & Thorson, 2001), and engenders a higher level of learner satisfaction (Liu & Schrum, 2002), as well as a positive influence on learners' attitudes. Interactivity has been shown to engage users in multimedia systems, to encourage revisits to a Web site, to increase satisfaction toward such systems, to enhance the visibility of Web sites, and to increase acceptance (Chen & Sockel, 2001; Dholakia, Zhao, Dholakia, & Fortin, 2000; Rafaeli & Sudweeks, 1997).

Within the academic community, there is little consensus of what interactivity is, and the concept often means different things to different people (Bucy, 2004; Dholakia et al., 2000; Johnson, Bruner, & Kumar, 2006; McMillan & Hwang, 2002; Yadav & Varadarajan, 2005). McMillan and Hwang (2002) suggest that interactivity can be conceptualized as a process, a set of features and the user perception. Interactivity as a process focuses on activities such as interchange and

responsiveness. Interactive features are made possible through the characteristics of multimedia systems. In a similar construction of the definition for interactivity, Rafaeli and Sudweeks (1997) consider interactivity as a process-related concept, where communication messages in a sequence relate to each other. However, the most important aspect of interactivity lies in the user perception on, or experience with, interactive features. Such an experience may very likely be a strong basis for future use intention.

Ha and James (1998) defined "interactivity" as "the extent to which the communicator and the audience respond to, or are willing to facilitate, each other's communication needs." Early studies tend to consider interactivity as a single construct where multimedia systems vary in degrees of interactivity.

As research continues to uncover the dynamic capabilities of multimedia systems, the definition of interactivity evolves to include aspects of hardware/software, processes during which the interactive features are used, and user experience with interactive systems. Dholakia et al. (2000) suggest the following six interactivity dimensions: (1) User Control, (2) Responsiveness, (3) Real time interactions, (4) Connectedness, (5) Personalization/Customization, and (6) Playfulness. Similarly, Ha and James (1998) suggest five interactivity dimensions: playfulness, choice, connectedness, information collection, and reciprocal communication, while Johnson et al. (2006) perceive interactivity along four dimensions: reciprocity, responsiveness, speed of response, and nonverbal information.

Within the context of multimedia systems, we view interactivity as a multidimensional concept referring to the nature of person-machine interaction, where the machine refers to a multimedia system. In the context of the Web, these multimedia systems range from two-way, one-to-one interactions to multiway collaborations. Figure 1 presents a conceptual framework

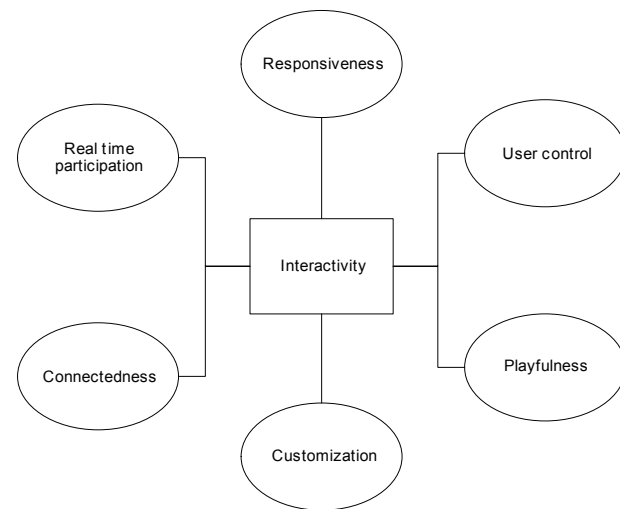
(derived from Dholakia et al., 2000) that characterized interactivity dimensions as follows:

- **User control:** The extent to which an individual can choose the timing, content, and sequence of communication with the system.
- **Responsiveness:** The relatedness of a response to earlier messages (Rafaeli & Sudweeks, 1997). In the Web environment, however, responsiveness is largely confined by user perception of how soon the system/Web should react to their requests. The usability literature has offered a proxy measure of eight seconds to be the threshold within which a Web site's response is considered tolerable.
- **Real time participation:** The speed with which communication takes place. This can range from instant communication (synchronous) to delayed response (asynchronous) communication. Instant messaging and online chats are examples of synchronous communication, while e-mail (Web or non-Web) characterizes asynchronous communication.
- **Connectedness:** The degree to which a user feels being connected to the outside world through the multimedia system (Ha & James, 1998).
- **Personalization/customization:** The degree to which information is tailored to meet the needs of individual users. Personalization/customization may be triggered by a user's request, or in the form of mass customization. The latter may be achieved by offering a tailored content based on user click-stream data collected through previous user communications with the system.
- **Playfulness:** The entertainment value of the Web offered through interactive features. Although traditional playful features involve games that only receive limited acceptance on many commercial Web sites, tools (such as Flash, AJAX, and dynamic HTML) all deliver some form of playfulness without sacrificing professional look of the Web site.

## TECHNOLOGIES AND PRACTICES

The growth in computational power, enabling ever increasingly multimedia features, coupled with advances in communication technologies and the Internet are pushing the interactivity frontier. Such technologies

Figure 1. Interactivity as a multidimensional concept



include, but are not limited to, a range of technologies from the basic point-and-click, to highly complex multimedia systems. In effect, the Web, with its ability to convey movies, music, graphics, and text, is driving a convergence of media. Recent advances in technologies such as interoperable semantic multimedia services (Tsinaraki, Polydoros, & Christodoulakis, 2007), technologies for DVB services on the Internet, and anthropomorphic agents are expected to continue to drive the interactivity frontier (Nan, Anghelcey, Meyers, Sar, & Faber, 2006).

Table 1 shows a framework from the existing literature to map important multimedia/Web features to the six interactivity dimensions discussed in Figure 1. The goal of this framework is to offer practitioners a basis to evaluate interactivity on their Web sites. For example, a Web site designer may want to compare her design with popular Web sites in the same industry to measure if they offer a similar level of interactivity. Two important issues concerning the comparison include what interactive features are recommended for comparison, and how to quantify interactivity features for comparison. The framework in Table 1 serves the purpose to answer the first question. One way to answer the second question involves simply counting the number of interactivity features in each of the interactivity dimensions. Such counting technique is referred to as the interactivity index (II) and is frequently used by researchers to quantify interactivity. The quantified results, if measured consistently, can be used for longitudinal or cross-industry comparisons.

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