Facilitating Interactions for e-Learning

Kim E. Dooley, James R. Lindner, & Larry M. Dooley

Interactions must be carefully planned and managed to facilitate learning at a distance (Moore, 1989, Wagner, 1994). What are the different types of interactions? How do you design and sequence interactions in for online learning settings?

Introduction

Researchers have discussed the importance of interaction when designing and delivering teaching and learning in virtual environments (Dooley, Kelsey, & Lindner, 2002; Kelsey, 2000; Hillman, Willis, & Gunawardena, 1994; Wagner, 1994; Moore, 1989). Wagner (1994) stated, “when distance educators discuss interaction, often their focus is on the attributes and outcomes of a real-time, two-way exchange of information. Interest in technologies should focus on this ability to expand opportunities for interactive communications; however, fascination with what the technologies do often supersedes the broader issue of teaching and learning dynamics” (p. 7). Wagner distinguishes between interaction as a function of effective instruction, and interactivity as a function of telecommunications.

Many technology mediated programs rely heavily on self-instructional text or lecture-based materials, failing to promote meaningful interactions among students, the instructor and content (Hirumi, 2002a). In an extensive analysis of 436 educational web-sites, Mioduser, Nachmias, Lahav and Oren (2000) found that only 12% of the sites encouraged any form of collaboration among students as supplements to on-line work and less than 3% supported on-line collaboration.

Emerging technologies can actually expand options for interaction among faculty and students. Kochery (1997) stated that an environment that provides for peer interactions, social support, interpersonal communications, and cooperative learning models can help create a learning community.

Transactional Distance

Learner satisfaction has been found to be related to interaction (Murphy, Lindner, & Kelsey, 2002). Learners prefer a setting that includes interaction between and among other learners and instructors (Fulford & Zhang, 1993; Garrison, 1990; Ritchie & Newby, 1989). How are interactions interpreted by the learner? Do all learners experience some form of “transactional distance” that impacts their abilities to interact with the content, instructor, and other learners?

Moore first introduced the concept of transactional distance in 1980. Transactional distance is a measure of distance, not as a geographical phenomenon, but as a "pedagogical phenomenon" (p. 200). Transactional distance involves the interactions between and among the instructors, the learners, the
content, and the learning environment. Distance can be described as the separation of the instructor and the learner in space, or time, or both. According to Moore and Kearsley (1996), there is always some transactional distance involved in a learning environment—even when the learners are in the same room with the instructor. By this measure, some on-campus course designs have greater transactional distance, and are thus more distant, than some courses designed to use technology to overcome geographical and temporal separation.

The importance of interaction has long been emphasized by Moore (1983, 1980, 1973). In many theories of learning, education is a specialized organization of communications (Flanders, 1970; Friedrich, 1982). Certainly, communications are central to any learning environment and the focal point of any e-learning delivery strategy (Murphy, Lindner, & Kelsey, 2002).

Before we plan interactions for e-learning, it is imperative to consider the use of active facilitation strategies when designing the instructional strategy or lesson plan (See Figure 1). We also need to explore the different types of interactions as discussed in the literature (Hirumi, 2002a).

**Case Study Connections**

An international corporation wanted to create a professional development unit on-line. Their training staff had very little prior experience in instructional design, including adult learning theory and interactive teaching strategies for e-learning. A multimedia specialist and instructional design professional were hired as consultants to infuse systematic instructional design and participatory training methods. The consultants conducted a needs assessment by interviewing the training staff and discovered that employees preferred lecture-based instruction and memory-based assessment. The trainers also expressed little motivation to attend the training because they lacked confidence in convincing employees to “learn” using active strategies. How can you convince the trainers and employees that there are benefits to including active teaching/learning strategies in this instruction?
List of Active Strategies Appropriate for e-Learning

- Synchronous (Real-time) audio, video, and/or text interactions with students in remote locations
- Read and post messages via email or discussion forums
- Participate in question and answer sessions
- Search for and retrieve information
- Write research, position or concept paper
- Interact with online quizzes
- Create, distribute, compile and analyze surveys/questionnaires
- Develop and/or analyze case studies
- Individual problem-solving exercises or projects
- Group/collaborative problem-solving
- Simulate a real-world event (e.g., courtroom trial, elections, space launch) using 2nd Life
- Interview others
- Visit community and do a digital photo elicitation
- Examine on-line resources
- Conduct library research online
- Create or receive RSS or Twitter feeds
- Participate in class presentations using Centra
- Examine and/or assess other students work

- Asynchronous audio, video, and/or text communications with students in remote locations
- Read and post information using announcements
- Search for and retrieve information on web-sites
- Chat with others in real-time on the Internet
- Create and give multimedia presentation
- Interact with Drag and Drop
- Interact with people in remote locations utilizing Voice over IP/Skype
- Generate and manipulate a database
- Generate and manipulate a spreadsheet
- Watch an instructional video or UTube video clip
- Organize, analyze, synthesize, and/or interpret information gathered from sources
- Participate in a debate online
- Participate in a panel discussion
- Attend guest lecture
- Interact with computer simulation
- Create and post on a blog or Wiki
- Reflective thinking and writing assignments
- Complete individual or group project
Types of Interactions

Learning theory suggests that interaction increases learning, motivation, and retention in distance education courses. Interactions help to personalize learning and promote intrinsic motivation. Interaction can be used to increase participation, develop communications, receive feedback, enhance elaboration and retention, support learner control/self-regulation, increase motivation, and negotiate understanding, and for team building, discovery, exploration, clarification, and closure.

Interaction requires the learner and learning system to respond dynamically to one another (Hirumi, 2002a). Borsook (1991) suggests that to be interactive, programs should simulate seven characteristics of interpersonal communications (i.e., immediacy of response, non-sequential access of information, adaptability, feedback, options, bi-directional, and interruptability). Merrill, Li and Jones (1990) and Weller (1988) also emphasize the dynamic nature of the interaction, requiring the learner and the technology to adapt to each other. Others focus on the quality of the interaction rather than the number, type or modality of responses. Jonassen (1995) depicts interactions as a function of the type of learner response, the meaningfulness of those responses, and the quality of the feedback provided.

Kearsley (1997) suggests that the single most important element of successful e-learning is interactivity among participants. Interactions enable both the instructor and learners to communicate and respond to each other’s needs and interests. Interactions may help reduce feelings of isolation and anonymity that can result in dissatisfaction, poor performance and attrition among distance learners. Interactions are also seen as one of the keys to transforming traditional teacher-directed instructional methods to learner-centered approaches (Cuban, 1993). Booher and Seiler (1982) found that learners’ avoidance of learner-instruction interactions can harm academic achievement. Without interactions, instruction may simply become “passing on content as if were dogmatic truth, and the cycle of knowledge acquisition, critical evaluation and knowledge validation, that is important for the development of higher-order thinking skills, is nonexistent” (Shale & Garrison, 1990, p. 29).

Michael Moore (1989) introduces a “communications-based” framework that specifies the sender and receiver of three key interactions (i.e., student–student, student–teacher and student–content). Student-student interactions occur “between one learner and another learner, alone or in group settings, with or without the real-time presence of an instructor” (Moore, 1989, p. 4). Student-teacher interactions attempt to motivate and stimulate the learner and allow for the clarification of misunderstanding by the learner in regard to the content. Student-content interactions are defined as a process of “intellectually interacting with content to bring about changes in the learner’s understanding, perspective or cognitive structures” (Moore, 1989, p. 2).

With the increasing use of computer-based delivery systems, Hillman, Willis and Gunawardena (1994) argue convincingly for a forth class of communication-based interaction (student-interface). Such interactions allow learners to manipulate electronic tools to complete tasks and participate in other learning events. The interface acts as the point or
means of interaction, between the learner and the content, instructor, fellow learners, or others. It includes learners’ use of electronic tools and navigational aids as well as the layout of text and graphical elements.

Carlson and Repman (1999) define learner-instructional interactions as those between the learner and the content that traditionally utilize strategies such as questioning, feedback and clarification, and control of lesson pace and sequence to facilitate learning. They further delineate social interactions as personal attempts to modify or enhance the quality of the instructional interaction by interpreting body language, promoting a sense of comfort, and developing class management routines. In contrast, Mortera-Gutierrez and Murphy (2000) focus on the roles of the instructor, extending the basic categories to include instructor-facilitator, instructor-peers, instructor-support staff and technical personnel, and instructor-organization interactions.

Hannifin (1989) describes a “purpose-based” framework that includes five basic functions for computer-based interactions: (a) confirmation, (b) pacing, (c) inquiry, (d) navigation, and (e) elaboration. With the emerging use of telecommunication technologies, Breakthebarriers.com (2001) identifies nine key functions: (a) synchronous communication, (b) asynchronous communication, (c) browsing and clicking, (d) branching, (e) tracking, (f) help, (g) practice, (h) feedback, and (i) coaching. In comparison, to guide the selection of on-line instructional strategies and tactics, Northrup (2001) proposes five interaction attributes (or purposes): (a) to interact with content, (b) to collaborate, (c) to converse, (d) to help monitor and regulate learning (intrapersonal interaction), and (e) to support performance.

Bonk and King (1998) focus on the use of specific technology tools, positing five levels of “tool-based” interactions: (a) electronic mail and delayed-messaging, (b) remote access and delayed collaboration, (c) real-time brainstorming and conversation, (d) real-time text collaboration, and (e) real-time multimedia and/or hypermedia collaboration. Still others, such as Bonk and Reynolds (1997) and Harris (1994a, 1994b, 1994c), describe different types of “activity-based” interactions or interactivities (i.e., critical thinking, creative thinking, information searching, information sharing, and collaborative problem solving).

Interactions in e-learning can be based upon communications (Moore, 1989; Hillman, Willis & Gunawardena, 1994; Carlson & Repman, 1999), purpose (Hannifin, 1989), tools (Bonk & King, 1998), or activities (Bonk & Reynolds, 1997; Harris, 1994a, 1994b, 1994c). But how do you incorporate interactions into your instructional strategy? Hirumi (2002b) has devised a framework to analyze, design, and sequence interactions for e-learning, the focus of the next section. For a list of active teaching strategies appropriate for distance education.
How to Plan for Interaction in Your Instructional Strategy

You may recall the discussion of Gagne’s Nine Events of Instruction from a learning theory and instructional planning tool perspective. We also previously introduced the notion of a learner-centered instructional strategy with the use of the SCentRLE model (Hirumi, 2002). Now we will synthesize these concepts using a five-step approach to plan for different types of interaction based upon your instructional objectives, resource availability, and context. For example, when working with adult audiences, the incorporation of experiences and authentic assessment strategies will integrate multiple perspectives, active participation, and construction of meaning.

Hirumi (2002) provides the steps to help plan for interaction in the instructional strategy. Each of the events associated with an instructional strategy may be considered an interaction; a transaction that occurs between the learner and other human or non-human resources. Educators can then select an instructional strategy and use each of the events to guide the design and sequencing of e-learning.

Step 1 – Identify essential experiences that are necessary for learners to achieve specified goals and objectives based upon the principles of adult education

Step 2 – Select a grounded instructional strategy based on specified objectives, learner characteristics, context and epistemological beliefs

Step 3 – Operationalize each event, embedding experiences identified in step 1 and describing how the selected strategy will be applied during instruction

Step 4 – Define the type of interaction(s) that will be used to facilitate each event and analyze the quantity and quality of planned interactions and

Step 5 – Select the telecommunication tool(s) (e.g., chat, email, threaded discussion) that will be used to facilitate each event based on the nature of the interaction.

Figure 4 depicts the components of an instructional strategy that may be used as a template to complete Steps 3-5. In the first column, list the events associated with a selected instructional strategy. To learn a relatively simple set of procedures and/or verbal information, teacher-directed strategies (e.g., direct instruction and nine events of instruction) may serve as a useful foundation for generating effective self-instructional materials. In contrast, a complex, problem solving goal that is open to multiple interpretations and alternative solutions may be better addressed by strategies that promote exploration and social discourse (e.g., inquiry learning, problem-based learning, experiential learning, and student-centered learning). Furthermore, if you are a "constructivist," you may tend toward the inquiry-oriented strategies for most goals and objectives.
### Components of an Instructional Strategy (Lesson Plan)

<table>
<thead>
<tr>
<th>Event</th>
<th>Description</th>
<th>Interaction</th>
<th>Tool</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Gain Attention</td>
<td>Description of how instruction will gain learners attention</td>
<td>Learner–Instructor</td>
<td>Threaded Discussion</td>
</tr>
<tr>
<td>2. Inform Learners of Objectives</td>
<td>Description of how instruction will inform learners of objectives</td>
<td>Learner–Content</td>
<td>Web Page</td>
</tr>
<tr>
<td>3. Stimulate Recall of Prior Knowledge</td>
<td>Description of how instruction will stimulate recall</td>
<td>Learner–Content Learner–Learner</td>
<td>Web Page Threaded Discussion</td>
</tr>
<tr>
<td>4. Present Stimulus</td>
<td>Description of how instruction will present stimulus information</td>
<td>Learner–Content</td>
<td>Web Page</td>
</tr>
<tr>
<td>5. Provide Learning Guidance</td>
<td>Description of how instruction will provide learning guidance</td>
<td>Learner–Instructor</td>
<td>Chat</td>
</tr>
<tr>
<td>6. Elicit Performance</td>
<td>Description of how instruction will elicit learner performance</td>
<td>Learner–Content Learner–Learner</td>
<td>Web Page</td>
</tr>
<tr>
<td>7. Provide Feedback</td>
<td>Description of how instruction will provide feedback</td>
<td>Learner–Instructor</td>
<td>Whiteboard</td>
</tr>
<tr>
<td>8. Assessment Performance</td>
<td>Description of how instruction will assess learner performance</td>
<td>Learner–Content</td>
<td>Web Page</td>
</tr>
<tr>
<td>9. Enhance Retention and Transfer</td>
<td>Description of how instruction will enhance retention and transfer</td>
<td>Learner–Instructor Learner–Learner</td>
<td>Threaded Discussion</td>
</tr>
</tbody>
</table>

In the second column, describe how you would actually operationalize each event. For example, how would you gain and sustain learners’ attention? How would you present learners with the instructional objectives? How would you stimulate the recall of prior knowledge? As you design each event, you may find that you need to add, delete, or re-sequence some events. The five steps for designing and sequencing interactions is an iterative process. As you work through one step, you may find that you need to revise the results of a preceding step.

In the third column, define the type of interaction(s) that will be used to facilitate each event. Does the event require learner-teacher interactions? Learner-learner interactions? Learner-content interactions? One event may require multiple interactions (e.g., to elicit performance, the learner may have to interact with the content as well as with other learners). This is a good time to analyze and reflect on the quantity and quality of your planned interactions to determine if you have included an appropriate combination. How many learner-instructor and learning-learner interactions are planned? Do students have sufficient opportunities to interact with one another and with the instructor? Do learners require access to others? Are there too many learner-instructor interactions, making it difficult or impossible for the instructor to manage all of the...
communications? Do students have access to sufficient content information? Do learners require access to manipulatives? If so, how are learners to acquire the manipulatives? Do students have sufficient opportunities to apply learned skills and knowledge? Are students given sufficient guidance and scaffolding to promote learning and self-regulation? Are the interactions designed and sequenced to facilitate, rather than inhibit, the achievement of targeted goals and objectives? You may find that you need to go back and revise your description of one or more events, again illustrating the iterative nature of the five-step process.

In the fourth column, select and map the telecommunication tool(s) that will be used to facilitate each event. Although your primary delivery system has probably been selected, you still have many options to consider. Your task is to determine the appropriate tool(s) for facilitating each interaction (defined in Column 3) that also fall within the confines of available resources. Relevant questions to consider include who are the primary senders and receivers of the communications? Do learners need audio, video, text and/or graphics? Are synchronous or asynchronous communications necessary? Are the communications one-to-one, one-to-some, or one-to-many? What kind of budget do you have? What kind of technologies and human resources are available? How much time do you have to prepare course materials? The resulting instructional strategy may then be used to generate flowcharts, storyboards, and prototypes of your instruction.

Conclusions
Advances in telecommunication technologies are increasing access to educational opportunities (Hirumi, 2002). However, they are not necessarily enhancing the educational experience (Hirumi & Bermudez, 1996). A five-step process for designing and sequencing e-learning interactions can be applied within the context of a systematic design model. By applying these steps, it is hoped that educators and trainers will be able to create effective e-learning programs that promote interaction and enhance learning.

Key interactions that can affect student attitudes and performance must be carefully designed and delivered as an integral part of e-learning. This chapter presented a three-level framework for analyzing, designing and sequencing e-learning interactions. Level I interactions consist of cognitive and metacognitive operations that occur within each learner’s mind and is distinguished to further emphasize the importance of self-regulation. Level II includes six classes that are divided into human and non-human interactions (i.e., learner-instructor, learner-learner, learner-other human, learner-content, learner-interface, and learner-environment). Level III (learner-instruction) interactions are viewed as a meta-level. Learner-instruction interactions provide educators with a set of events (an instructional strategy) that may be based on research and theory to provide a grounded approach to designing and sequencing Level II and stimulating Level I interactions. Our next chapter will discuss the delivery strategies available to promote interaction at all levels.
References


Russell, T. L. (1993). The “no significant difference” phenomenon as reported in research reports, summaries and papers. Raleigh: North Carolina State University Office of Instructional Telecommunications.


