Abstract

Instructional scaffolding is a process by which an instructor supports a student in executing a learning task. Designers of virtual learning environments are challenged with replacing the verbal and visual scaffolding present in face-to-face classes for their online students. This paper describes how to build scaffolding in online interactive graduate courses.

Keywords: scaffolding, online courses, instructional design, distance learning

Introduction

Face-to-face teaching involves a number of strategies to encourage the process of learning. Watching and reacting to what we see students doing as they learn creates a responsive style of teaching that looks for the “teachable moment”—that time and place where learners are ready to leap from one stage of cognitive mastery to another. What teachers do to promote that leaping has been called “scaffolding.”

Scaffolding refers to instructional devices that enable students to complete tasks they would be unable to master without assistance. Vygotsky’s zone of proximal development (ZPD) is central to the scaffolding construct. ZPD refers to the “distance between the actual development level as determined by individual problem solving and the level of potential development as determined through problem solving under adult guidance, or in collaboration with more capable peers” (as cited in [1]). The construct of scaffolding was originally used [2] to describe tutorial interactions between an adult and a child. Palincsar’s [1] seminal work with teaching children how to read highlighted the role of dialog in providing scaffolding.

In other words, scaffolding can be defined as those strategies that a teacher uses to help learners span a cognitive gap or leap a learning hurdle. These strategies evolve as the teacher watches and listens closely to what the learner is doing. In these early studies, scaffolding occurred primarily in oral, face-to-face learning situations. In traditional classroom interactions scaffolding may include modeling behaviors, coaching and prompting, thinking out loud, dialogue with questions and answers, planned and spontaneous discussions, and so forth—any device that structures assistance to help the learner bridge a cognitive gap.

When we teach students who are not physically present, we are forced to adapt to an environment where face-to-face interaction is usually absent. A different kind of scaffolding must thus be constructed to replace the verbal and visual structures we take so much for granted if we are to be successful in constructing an interactive, collaborative learning environment for distance learners. This new form of scaffolding consists of two elements: (1) instructional scaffolding to facilitate the interactive nature of teaching and learning described in Palincsar’s metaphor, and (2) procedural scaffolding that helps students manage the online learning environment.

In recent years, the scaffolding metaphor has been expanded to include non-verbal instructional guidance. For example, textual scaffolding is used to help beginning readers [3] and embedded prompts such as help screens or pull down menus [4] give procedural, not instructional, clues. Jelfs et al. [5] of The Open University have evaluated student toolkits as a method of scaffolding, while Sharma and Hannafin [6] studied specific online scaffolding strategies to support the development of critical thinking skills. This paper will discuss how we use scaffolding to provide an authentic interactive
learning environment online in our Master of Science in Technical Communication Management at Mercer University. Specifically, we will describe how we build scaffolding into our online syllabi, how to create instructional units, and how to design and create an online learning space.

**Instructional Design for Online Courses**

Many instructional design models have been developed for face-to-face instruction and adapted for online education and training. Essentially, these models help instructional designers answer these three questions:

1. Where are we going? (learner and task analysis)
2. How will we get there? (instructional strategy and medium), and
3. How will we know we have arrived? (assessment and evaluation) [7]

During the learner and task analysis phase, designers gather information about the students and the learning tasks, determining what the students should be able to know or do when they finish the tasks.[8, 9] To answer the question ‘how will we get there’, designers evaluate what must be taught, in what order, how to best teach it, and what media are most appropriate.[10, 11] In the last phase, designers select the assessment tools to determine how well the students learned and what changes need to be made before teaching the course again.[12]

**Learner and Task Analysis**

Before beginning to design any course, instructors should conduct a learner analysis to collect data about students taking the course. This analysis is similar for both traditional and online classes, but may be more difficult for online classes, due to the diverse nature of students enrolled in these classes.

In our MSTCO program, for example, we know that since our students are adults, the characteristics of andragogy [13] shape how we design the instruction. For example, adult learners are usually highly motivated, self-directed, and independent learners; seek courses that are relevant to their personal/professional goals; want clearly specified course goals; bring extensive experience to the classroom and expect to participate in the learning process; and must be able to complete their learning tasks in the small ‘chunks’ of free time between their professional and personal obligations. Carefully laid scaffolding can meet many of the design decisions driven by this analysis.

An important part of learner and task analysis is identifying the learning goals and outcomes for the course, i.e., what the instructor expects the students to be able to do or know by the time they finish the course. In the traditional classroom, instructors often include the overall learning outcomes on their syllabi. Specific learning objectives for each class session are sometimes, but not always, stated verbally at the beginning of the class, and often in a very informal manner. These verbally stated learning objectives must be translated into written form for online courses, not only because they identify the skills and knowledge the student must master but because they provide the rationale for the course activities.

**Instructional Strategy and Medium**

Teaching online requires course designers to write the learning outcomes and learning objectives and define the sequence of instructional events to reach those outcomes for the entire course prior to starting the course. In terms of our scaffolding metaphor, this planning is analogous to building the framework for each room (instructional objectives), arranging the rooms into floors (grouping objectives from lowest to highest cognitive level), creating a pathway from room to room and floor to floor (sequencing objectives), defining the activities that occur within each room (instructional events), and making this entire structure visible to the students (through the design of the ‘physical’ environment). Simply uploading all the course materials and handouts for a traditional course without a framework that defines how all the pieces of the course are related results in overwhelming confusion for the students.

Regardless of their teaching environment, all instructors must decide what content to include in their courses, how to best present that content, how much material to include in each lesson, and how to sequence the instructional material. Many excellent textbooks and articles contain information on this, the instructional strategy phase, of the design process. While the process is similar for traditional
and online courses, online course designers have the added task of making these design decisions explicit, because they provide the scaffolding for the rooms and floors of the course being built. In this next section, we discuss some of these design decisions and how we make them explicit in our online course’s syllabus, instructional unit design, and course environment design.

The Syllabus

In our MSTCO program, we use the syllabus to provide the framework or scaffolding for the entire course (building). Unlike a static, hard-copy syllabus that is normally handed out on the first day of the traditional face-to-face class, the online syllabus takes advantage of the features of the Web. The various elements of the syllabus contain links to all the learning events, activities, and course assignments. Following these links provides pathways to the various rooms and floors that constitute the course. Additionally, the syllabus is instantly revisable to allow for more detail and explanation, updating of schedules, and adapting to student feedback as the course progresses. With its clearly marked links and connections to other parts of the online course, the syllabus becomes a kind of scaffold that works as a blueprint or map for students to follow from the course’s beginning until its end. In addition to this mapping scaffold, the syllabus also contains sections that further support student learning.

Course Schedule

Within the context of the scaffolding metaphor, instructors need to provide several pathways for students to navigate from room to room and floor to floor. Another tool we have found useful is the course schedule, which is a pivotal element in the syllabus. The schedule provides an overview of all the instructional events and activities for the course, arranged in chunks of time—usually weekly. Using hyperlinks, students can access each of the instructional units, their assignments, additional resources, and chat transcripts, which are posted within 24 hours of each chat session. The schedule is updated weekly and changes to assignments or due dates are highlighted in a different color.

Instructional Unit Design

Another significant design decision that must be made for online courses is how to “chunk” the instructional content and activities. In traditional classrooms, this decision is profoundly influenced by the length of the class period, usually 50 to 75 minutes. However, there are no such constraints in an online class. Instructors must analyze the instructional activities associated with each learning objective and cluster these activities into logical instructional units. It has been our experience that we usually underestimate the amount of time it takes students to complete a unit, particularly in a collaborative learning environment where students help shape and build the course content. This is where we find the idea of the instructional unit, or ‘room’ to be helpful. Each unit is shaped by the learning objectives and contains specific instructional events. However, we often find that we modify these units, both in terms of content and activities, based on the input of our students.

In our MSTCO program, we typically organize a 15-week semester course into 15 instructional units. A typical instructional unit is shown in Figure 1.

Figure 1. Instructional scaffolding orients students to the learning tasks.

The unit contains scaffolds or assistance to help students focus on the important concepts, to provide prompts to guide learning activities, and to relate
what is being learned to their professional or personal interests. Note that smaller, specific learning objectives for the instructional unit are clearly defined, as are the procedures for completing the various instructional events, such as the assignment, discussion board and chat. Links to the assignment and discussion board provide additional help in navigating.

Assignments & Deliverables

Finally, instructors must decide on the type of assignments and deliverables they will use to assess student learning. Because our program has practice-based learning goals, assignments are project-based and often team-based. Each assignment begins with an overview describing the assignment goals, followed by specific learning objectives. Scaffolding that would normally be provided in the form of verbal directions from the instructor is replaced in the online course with more information and specific procedures for completing the assignment. This type of scaffolding supports the students by keeping them focused on the tasks to be accomplished.

Course Environment Design

In a brick and mortar building, the classroom environment is not usually the responsibility of the traditional classroom instructor. Teaching online, however, requires that we design and construct the “classroom” or learning space. In designing the homepage and other pages, for example, instructors must contend with issues such as page layout, color, graphics, typeface, type size; or technical considerations such as load times, passwords, server size, procedures and space to upload student assignments.

The homepage is an important part of the course environment. We have designed our MSTCO homepage to create automatic links to some resources outside the WebCT platform, thus making the homepage operate somewhat like a portal. The homepage for the sample MSCTO course, shown in Figure 2, organizes the various course elements so that they are easily accessible by the students.

![Figure 2. Navigational cues built into an online course homepage help orient students to instructional tasks and resources.](image)

Making use of some hierarchical design features on the homepage can help establish clear, functional navigation for the students. While course management systems include a navigation bar as a feature, they do not automatically organize the course information so as to make the course structure and content visible and useful. Creating a homepage with links to outside resources, groupings of information in content modules, and one-click access to frequently used course sections will enhance the student’s ability to see how the course environment works and allow students to access more easily instructional supports found within the syllabus, instructional units, and assignments and deliverables explanations.

References


**About the Author**

Helen M. Grady is an associate professor in the Department of Technical Communication at Mercer University, where she has taught over 20 different undergraduate and graduate technical communication and entry-level engineering courses since 1991. She directs the online Master of Science in Technical Communication Management. She is the founding director of Mercer’s Center for Excellence in Engineering Education and has been active in educating faculty in instructional technology and active learning strategies. Prior to joining Mercer, she managed a technical publications division for a Fortune 100 corporation in Research Triangle Park, NC for 10 years.

Grady is a senior member of IEEE, serves on the AdCom of the IEEE Professional Communication Society, and was the 2005 program chair of the International Professional Communication Conference in Limerick, Ireland. She is an associate fellow of STC and a recipient of the Jay R. Gould award for teaching excellence in technical communication.