The equivalency—as opposed to equality—of online classrooms is important. This article defines equivalency and offers steps for achieving it.

Making Decisions: The Use of Electronic Technology in Online Classrooms

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Give a two-year-old a hammer, and suddenly a lot of things need hammering.

Determining appropriate technologies to use for online instruction is quite easy: use everything available. The key to success in a distance learning classroom is not which technologies are used but how they are used and what information is communicated using the technologies. Professors must not fall into the trap implied by the law of the hammer—noted at the top of this page—by advocating one approach or a small number of approaches. Instead, a smorgasbord of learning experiences for distant and local learners should be available to students (Simonson, Schlosser, & Hanson, 1999). This advice is based on equivalency theory. After defining equivalency theory, I will propose steps for achieving equivalency.

Defining Equivalency Theory

Online students and those in face-to-face classes learn in fundamentally different environments. Despite the differences, every student should have the opportunity to learn in acceptable and appropriate ways. Some professors attempt to make experiences equal for online and face-to-face learners. A more appropriate strategy is to provide different but equivalent learning experiences to each learner. In other words, it is important to employ a variety
of technologies to help students achieve learning outcomes. Equivalency is the foundation for this. “The more equivalent the learning experiences of distant learners are to those of local learners, the more equivalent will be the outcomes of the learning experiences” (Simonson et al., 1999, p. 70).

Equivalency is achieved through a variety of learning experiences that are tailored to the environment and situation in which students find themselves. It is likely, for example, that different students in various locations, learning at different times and rates, may require a different mix of learning experiences. Some may need a greater amount of observing, whereas others need a larger dose of doing. Thus, the goal of instructional planning is to make the sum of experiences for each learner equivalent and to select instructional technologies that store and deliver the learning experiences effectively. Again, equivalent learning experiences are different from equal learning experiences. Just as a triangle and square that have the same area are considered equivalent even though they are different geometrically, the experiences of the local learner and the distant learner should have equivalent value even though their experiences might be very different.

**Achieving Equivalency**

Achieving equivalency in learning can be accomplished through selecting appropriate technologies for online instruction. That is, equivalency theory must be applied to design and pedagogical decisions. Here are four steps for selecting appropriate technologies.

**Step 1: Assess Available Instructional Technologies.** This article discusses online technologies; superficially, that means a computer and a network. However, embedded within computers and networks are capabilities permitting the delivery of instruction using a variety of media. Assessing available media is a two-step process: determining appropriate levels of abstraction in media, and identifying the lowest common technologies.

First, a professor must determine the level of abstraction that is most efficient for learning. Most online messages can be stored as verbal symbols (words spoken and written), visual symbols (line drawings and graphics), pictures, motion pictures, real-time video, and recorded or edited video.

This list is similar to one proposed by Edgar Dale (1946). His “cone of experience” organized experiences from realistic to abstract. The top levels of Dale’s cone listed words and visuals. They were the most abstract experiences and the easiest to use for instruction. For example, talking or lecturing about the life of a Greek sponge fisherman is much easier to do and requires fewer resources than going to Greece to work on a sponge boat for a year. The bottom levels of the cone listed realistic experiences, such as actually doing something in the real world, like going to Greece.

Obviously, the resources—both economic and technological—necessary for providing totally realistic, real-world learning experiences are substantive. As Dale implied, there is tension between efficiency (abstract
experiences requiring fewer resources) and effectiveness (realistic experiences that can require many resources). This tension is at the core of instructional decisions. The professor should pick learning experiences that are no more realistic than necessary in order for outcomes to be achieved. Overly abstract learning experiences require the student to compensate or to learn less effectively. Overly realistic experiences waste resources. When the professor who is designing online instruction selects the correct media, the process is most efficient.

Second, assessing available technologies often requires that the professor determine the level of lowest common technologies (LCT). This means that the sophistication of the computer and software of all learners and the professor should be determined. Often, LCT is determined by having students complete a survey in which they clearly identify the technologies available to them. Another strategy for ensuring a standard LCT is to require a minimum computer and telecommunications capability before students are allowed to enroll in a course. For example, a 300 MHz, Pentium II computer with 128 Mg of RAM, a 10 GB hard drive, a sound card, video card, video camera, speakers, microphone, and 56KB modem or ISDN connection might be required of students.

Either option has its advantages and disadvantages. Most likely, a minimum technology level will be required for online instruction to provide experiences equivalent to traditional instruction.

**Step 2: Determine the Learning Outcomes.** Learning outcomes are the observable, measurable behaviors that are a consequence of online instruction. When learning activities are designed it is important that some expectations for students be identified to guide the selection of appropriate technologies.

Online environments should be media-rich and strive for authenticity; thus, it is critical that many technologies be used. It is also important that students demonstrate learning outcomes by using a variety of technology-based activities. Students may be expected to take a test to demonstrate their competence, but more likely they will be expected to offer some kind of real-world project that gives an authentic assessment of what they learned. Rubrics—which simply are predetermined heuristics to guide grading—should be available to guide students as they develop course projects. (See Article Nine of this volume for a complete discussion of rubrics and evaluation.)

One strategy used by developers of online instruction is to collect student projects and use these materials as models for subsequent students. If this strategy is used, a thoughtful and comprehensive critique of these student projects should be included so mistakes are identified and not repeated. Some developers of instruction advocate that students should begin with existing materials and redesign them to eliminate weaknesses, build on strengths, and add new concepts. Specifically, text used in a lesson could be analyzed and replaced with graphics or word pictures that are combinations
of text and graphics representing teaching concepts (Cyrs, 1997). Still pictures could be modified and upgraded to animations, and synchronous chats could be made more effective by including a threaded discussion strategy that involves asking questions, collecting answers, asking follow-up questions, and selecting most appropriate final responses.

Traditionalists identify learning outcomes in terms of behavioral objectives with specific conditions under which learning will occur, a precise behavior to be demonstrated that indicates learning, and an exact standard to measure competence. Recently, learner-identified objectives have become popular—students are expected at some point during the instructional event to identify what changes they feel are important indicators of learning. Whatever approach is used, it is critical that outcomes of instructional events be clearly identified at some point.

Step 3: Identify Learning Experiences and Match Them to Appropriate Available Technology. Usually, the content of a course is divided into modules or units. Traditionally, a module requires about three hours of face-to-face instruction and six hours of student study or preparation. A three-credit college course would have twelve to fifteen modules. In an online course, the classical approach of organizing content around teaching and study time is no longer relevant. Thus, content from face-to-face courses is sometimes simply converted into online modules. For new courses, this approach will obviously not work.

An alternative approach is to organize a course around themes or ideas that directly relate to student activities or learning activities. For example, a course in history about the Reconstruction, the period following the American Civil War, might have twelve modules, each with five learning activities, for a total of sixty. The learning activities would be content-centered experiences, such as reading assignments, PowerPoint presentations, and audio recordings, or learner-centered experiences, such as threaded discussions on specific topics, research assignments using Web search engines, or self-tests.

An example module from this course might deal with the economic redevelopment of the South, beginning with a reading assignment about the economic conditions in the South. The reading would be followed by participation in an online discussion with a small group of classmates. This discussion would ask students to identify five impediments to effective economic development. When the list was agreed to by the group, it would be posted to the course’s bulletin board for grading by the professor. The third learning experience in this module would be a review of a PowerPoint presentation with audio prepared by the professor that discusses what actually happened economically in the South after the Civil War. Finally, each student would be expected to write a two-page critique of the period of economic development according to a rubric posted on the World Wide Web. This assignment would be submitted electronically to the course’s professor for grading.
Subsequent modules in this course would be designed similarly. At several points during the course, benchmark projects would be required of students, such as an individual online chat with the professor or the submission of a major project that synthesized work completed for module assignments.

Once the course's content is organized into modules, the next design requirement is to match learning experiences to technology-delivery strategies. The reading assignments could be delivered using the textbook, posted as files to be downloaded, or even read directly from the computer monitor. PowerPoint presentations could be handled the same way, and used directly from the computer or downloaded and studied later. E-mail attachments could be used for assignment submission and chat rooms or e-mail could provide ways to hold threaded discussions. If a learning experience, such as listening to a speech by a government official, is inappropriately delivered, perhaps as text rather than recorded audio, the value of the learning experience for the student who is forced to read rather than hear will not be equivalent and the student will have to compensate to achieve the same outcome.

In this example, the instructional media are relatively simple ones. What is sophisticated is the design and organization of the activities and the content facilitated and delivered by the media.

**Step 4: Prepare the Learning Experiences for Online Delivery.** Basically, there are four strategies for organizing instruction for online delivery: linear programmed instruction, branched programmed instruction, hyperprogrammed instruction, and student programmed instruction. In each case, the content of the course is subdivided into modules. The modules consist of topics that relate to one another or have some sense of unity or consistency, such as the economic condition of the South after the Civil War. The modules themselves, and the learning activities within the modules, are organized according to one of the four delivery strategies listed earlier.

Linear programmed instruction, a long-standing approach to individualized instruction, requires that all content be organized into concepts that are presented in blocks or chunks. Students review content, take a self-test, and if successful move to the next chunk or block of information. This happens sequentially until the content blocks are completed. Students move in the same order through the sequence of concepts. The teacher determines the order of the concepts or chunks.

Branched programmed instruction is similar except the self-tests are more sophisticated so students can branch ahead, if they are exceptionally proficient, or move to remediation, if they are floundering. As with linear programmed instruction, the order and sequence of instruction—including branches—is determined by the professor.

Hyperprogrammed instruction, widely advocated for Web-based online instruction, also organizes content into modules and concepts, but it permits students to move through the learning activities at their own rate and pace, in a route they determine themselves. In other words, learning experiences
are identified and mediated, and students use them until either a professor- or student-determined outcome is met. Often, each module has a terminal activity that must be completed before the student moves to the next course module.

Finally, the student-programmed approach uses an extremely loose structure where only the framework of the content is provided to online learners, who are expected to provide the structure, outcomes, and sequence of learning activities. For example, students who enroll in a course titled The Reconstruction Period would be required to organize and sequence the modules and activities, and during the course to identify personal outcomes and activities to be accomplished.

**Summary**

The law of the hammer implies that it is simple to select media and technology based on reasons other than instructional ones. This article advocates making decisions based on what is the best way to facilitate learning. Also promoted is the idea that if teachers attempt to make instruction equal for all students they will fail. Rather, the teacher of online instruction should provide a wide collection of activities that make possible equivalent learning experiences for students using an approach that recognizes the fundamental differences between learners distant and local. Equivalency is more difficult, but it promises to be more effective.

**References**


