How to Teach Online: What the Research Says

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Though there are some research results to guide best practice in online teaching and learning, these studies still represent a new frontier in educational research. With many faculty members being encouraged to *go online*, there is an urgent need for a review of the early research in this area to help guide faculty members' understanding about effective ways to teach online (Broad, 1999). This article, then, provides our review of current research regarding online instruction to help faculty members make research-informed decisions regarding online course design, course management, course learning environment, and course evaluation. We will provide seven helpful hints and back them up with research results.

1. Provide Helpful Resources on the Course Site

Greene and Land (1999) explored instructional scaffolds to support cognitive functioning. They found that guiding questions helped students focus and develop their projects. Students needed real-time, back-and-forth discussion that did not allow them to ignore confusion.

Some researchers discovered that supplementary resources and organization of delivery helped students. Cooper (1999) provided online resources and course materials in folders for each week of the course and found positive results. Students could find timely course announcements, lecture notes, and chapter questions and answers. Bee and Usip (1998) found that students who used supplementary materials, tutorials, and general course information that were provided online, realized improved course performance and improved knowledge of cyberspace over those who did not use the materials.

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2. Let Students Have Control Over the Pace at which They Move Through the Course

Other research interests included pace of instruction and delivery features. The results of the research on pace were mixed. Schrum (1995) found that students appreciated being able to move through the course at their own pace with successful students moving more quickly through the course than less-successful students. Mayer and Chandler (2001) explored the benefits of a modest amount of computer-user interactivity that determined the pace of the presentation. Students performed better on transfer but not retention of material.

3. Have Lots Of Discussions

Davidson-Shivers, Tanner, and Muilenburg (2000) were interested to learn which is better: synchronous or asynchronous discussion. They found chats provided a direct immediate environment for responses, while listserv responses were delayed but more focused and purposeful. Kanuka and Anderson (1998) raised concerns about students posting inconsistent and unchallenged ideas and concluded that online interactions provided little negotiated meaning or new knowledge construction. Ahern and El Hindi (2000) shared the same concerns; they created the *IdeaWeb* to improve peer-to-peer discourse, allowing self-management of discussions by students.

Winograd (2000) explored the effect of a moderator in online conferences, developing a theory that even a low degree of moderation techniques allowed a group to form a community, as determined by the elements of camaraderie, support, and warmth. The online environment does seem to offer a unique social advantage for some students. Sullivan's (2002) research pointed to the advantage of anonymity in a networked learning environment. Respondents suggested "it's easier to be yourself if you're invisible" (p. 139) and "there is no stereotyping or bias" (p. 139). Althaus (1997) conducted a study to examine whether supplementing a face-to-face discussion with computer-mediated discussions would enhance academic performance. He pointed out that because online discussions do not occur in real time, students are able to log on and join the discussion when it is convenient, and have more time to read messages, reflect on them, and compose thoughtful responses. He concluded that students who were actively involved in the computer-mediated discussions earned higher grades than other students.

Mikulecky (1998) compared class discussions in online and campus-based versions of a graduate course on adolescent literature. Electronic interchanges were no less productive than in campus-based instruction and were characterized by the following patterns: (1) rich descriptive presentations of situations, dilemmas, and solutions; (2) detailed, thoughtful responses and counter responses to fellow students including suggestions for further professional development; (3) comments to link to one's own experiences as well as spur and synthesize new thoughts; (4) sharing of troubling professional experiences and provision of support to others; and (5) occasional debate.

Vonderwell (2003) conducted a qualitative case study to examine asynchronous communication experiences and perspectives in an online course. The instructor attempted to facilitate class discourse through e-mail and discussion boards. Vonderwell learned that students were uncomfortable about interacting with students they did not know prior to taking the course. Online instructors need to know group processes and dynamics as well as strategies of how to engage students in effective communication and learning. Therefore, it is important to establish a community of learners (Knupfer, Gram, & Larsen, 1997; Wilson & Whitelock,

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1998). Suggestions include establishing groups early, keeping the interactions high in discussions, modeling and reinforcing effective communication, identifying potential problems, and designing a plan for dealing with them.

4. Provide Timely Feedback to Students About Their Performance

Students need feedback in a timely manner so they can proceed and learn from their errors. In regular face-to-face courses, feedback can be given orally in class, written on assignments before they are returned, or sent via e-mail to students. In online classes, this can be done in a similar fashion. Students can also receive feedback in a chat room, or on a discussion board, and feedback should be as immediate as possible. During online discussion, the lack of immediate feedback from instructors can allow students to procrastinate or even withdraw from the discussion (Mikulecky, 1998). Late feedback can also facilitate poor student performance. Instead of teaching 3 hours a week in one time block, instructors must learn to teach almost daily in smaller time blocks, because students want and need individual feedback in a timely fashion.

5. Provide Technical Support for Students (and Faculty Need It, Too!)

Technical support in online classes can be divided into technical support for students and for instructors. With support, instructors can proceed with their instruction and also learn to help students with minor technical problems.

Although we did not find research that evaluated the effectiveness of technical support for online classes, we did find many studies whose results demonstrated that faculty want technical support for online teaching (Betts, 1998; Dooley & Murphrey, 2000; Schifter, 2001). Faculty expressed a need for course development assistance and a system of evaluation and assessment of distance education and faculty. Two studies related to instructor experiences in course preparation (Gibson & Herrera, 1999; Zhang, 1998) discussed the need for time for development of the courses. In the first study, faculty said that the preparation of courses was much more time-consuming than they had expected. They said they needed released time for course development. The researchers in both studies concluded that faculty members need assistance both during the development of the course and during the delivery of the courses.

Regarding students in online classes, few studies reported results about technical support. In one study, students did say they wanted administrative support in online courses for grade reporting, helping with scheduling courses online, online admissions, appropriate fees for online courses, and tuition payments offered online for the convenience of online students and other students (Vallejo, 2001). Administrators polled in another study believed that their job related to online learning was to facilitate delivery of high-quality courses (Husmann & Miller, 2001). Technical support would be one area of this delivery. Students do want support when they are having technology problems, and an infrastructure should exist to provide this support.

6. Online Study Aids and Step-by-Step Presentation May Not Make Much Difference in Achievement

While there are many options available that will enhance an online course, not every technique used in the traditional classroom works well online. In a study done in 2001, Mayer and Chandler conducted a study on the possible benefits of adding simple user interaction to a multimedia presentation. Some received information in a segment-by-segment presentation followed by a presentation of the whole concept, and others were presented the whole concept first followed by a segment-by-segment presentation. Results showed little difference in retention rates between the two groups but significant differences in transfer rates, indicating that deeper understanding is improved through segment-by-segment followed by whole presentations.

In another experiment, these researchers found that learners who were given control over the pacing of the learning had a significantly higher transfer rate. Incorporating student involvement through interactivity can promote deeper learning from a multimedia presentation if it is done in a theory-based manner. If a higher level of learning is desired, student control of the multimedia makes a significant difference.

Another area of concern is the effectiveness of online study aids. Maki and Maki (2000) compared students enrolled in a general psychology course online to students in traditional classroom sections of the course. Online instructors had the option of controlling the pacing of review exercises and receiving substantial data on the students' usage of the exercises. This study was done to attempt to modify pro-

crastination behavior by offering credit to those students who used the study aids throughout each assigned chapter. Some sections were given rewards in the form of mini-quizzes after previewing frequently asked questions (FAQs); other sections received rewards in the form of mini-quizzes after previewing chapter outlines. Students who were rewarded did access the FAQs pages more often than not, and those who used the FAQs pages received high scores on the FAQs-related questions on the midterm examination, but not on the cumulative final examination. Students with the chapter outline mini-quizzes did not access the chapter outline pages at a significantly higher rate than those who did not have the quizzes. Also, a significant number of the students waited until 2 days prior to the due date to access their respective pages, and did not return to the FAQs or chapter outline pages to review for the final examination at a significantly higher rate than those who had not received the rewards. Thus, the gains in examination performance were short-lived and did not show any effect on performance during the cumulative final examination.

Along the same lines of study, Schnackenberg and Sullivan (2000) designed a project to look for links between learner control and learner effectiveness. They also theorized that students who took more control would have more positive attitudes toward their computer-assisted instructional programs than those under a more-controlled program, but there was no significant difference in achievement between the program control group and the learner control group even though satisfaction was greater.

7. Evaluation Can Be Enhanced in Online Courses

To investigate a persistent concern of academic integrity in online learning, researchers (Ridley & Husband, 1998) compared grade point averages (GPAs) of students who completed courses in both traditional and online formats. They hypothesized that if students cheated more in the online courses, their GPA should be higher in the online courses than in courses taken in traditional classrooms, but they found just the opposite. Students' GPAs in courses in the traditional format were higher than those in online courses. The researchers concluded that the concern over academic integrity was either exaggerated or unfounded. However, the conclusion was not convincing because of confounding variables uncontrolled in the comparison. The GPA's could be based on different courses students took or different tests instructors used to measure students' learning in the two instructional environments. The higher GPA in regular classrooms could also be the result of superior quality of instruction of courses taught in regular classrooms. The conclusion sounds especially suspicious when the prevalence of online cheating and plagiarism was reported by faculty and administrators engaged in online instruction (McAlister, Rivera, & Hallam, 2002; Olt, 2002).

We may need to adapt a new perspective when we plan and administer evaluations in online courses. In traditional classrooms, evaluation is used for promoting learning, guiding instructional decision making, diagnosing learning and performance problems, and determining what students have learned (Ormrod, 2003). Teachers and students are most likely to be interested in the function of determining what students have learned. Because information obtained from the evaluation process usually is used for summative purposes or making judgmental decisions, fairness of the evaluation is the biggest concern of teachers and students in regular classrooms, therefore, standardization of instruments and the process of the evaluation is very desirable from a traditional perspective of evaluation.

In an online environment, instructors at least partially lose the standardization of content and format in evaluation, and therefore need to alter their view of how evaluation is done for their instruction. The formats of assessment that they have been using in traditional instruction, such as term papers and multiple-choice questions, may not provide valid and comprehensive information on students' learning. Educators have been trying a great variety of evaluation practices in the online environment, and what they reported in research papers features one thing: multiple criteria.

The multiplicity of online evaluation is reflected in domains covered in the evaluation. Educational psychologists have categorized students' learning into different domains. For example, Bloom, Englehart, Furst, Hill, and Krathwohl (1956) proposed classifications of learning in cognitive, affective, and psychomotor domains. Gagné (1985) divided learning outcomes into five domains of verbal information, intellectual skills, cognitive strategies, attitudes, and psychomotor skills. In traditional classrooms, evaluation is usually focused on the cognitive domain; that is, students' acquisition and use of information. For online instruction, instructors broaden the scope of their evaluation to cover other domains too, especially the affective and psychomotor domains.

The cognitive domain is still the area with the highest interest for

teachers and students in online courses. Traditional tools of evaluation, such as multiple-choice questions and in-class examination, are still commonly used in the online environment (Dellana, Collins, & West, 2000; Gilliver, Randall, & Pok, 1998; Hiltz, 1993; Maki, Maki, Patterson, & Whittaker, 2000; McManus, 2000; Smith, Smith, & Boone, 2000). However, new methods have been created for evaluation of learning in the online environment. Using software that keeps all correspondence of instructors and students during instruction and learning, educators analyzed depth and breadth of students' cognitive processes in learning. For example, Davidson-Shivers, Tanner, and Muilenburg (2000) classified students' online discussions into substantive (related to topics and contents) and nonsubstantive categories (nonrelated to topics and contents) to see whether students spent their online learning time efficiently. Kanuka and Anderson (1998) investigated the depth of the online interaction of students into five levels from the shallowest process of sharing information and opinions to the deepest process of explicitly phrasing agreements, statements, and applications of new knowledge. They found most students process information at the shallow levels. These online interactions did not help them construct new knowledge.

In addition to the learning outcomes in the cognitive domain, researchers were also interested in learning outcomes in the affective domain, such as students' attitudes, satisfaction, and perceptions of the online environment. Some educators described students' satisfaction with their learning experience in online courses and perceived effectiveness of different learning activities used in online instruction (Althaus, 1997; Edwards & Fritz, 1997; Hansen & Gladfelter, 1996; Richards & Ridley, 1997). They found college students generally showed positive perceptions of learning outcomes and the learning environment of online courses and wished the same or similar online materials or activities were available in other courses. More often, researchers investigated how learners' satisfaction was related to learners' characteristics and features of online instruction (Bee & Usip, 1998; Gunawardena & Duphorne, 2001; Mortensen & Young, 2000; Swan et al., 2001; Wells, 2000). Other variables in the affective domain, such as computer anxiety, were also investigated in research (Maki et al., 2000).

In the psychomotor domain, researchers took advantage of the fact that computers automatically recorded the interactions between the user and the machine to study students' learning behaviors in the online environment. Taraban, Maki, and Rynearson, (1999) observed how students in online classes spent their studying time and compared it with the pattern of time-spending in regular classrooms. They found students in both conditions shared the same behavioral pattern of "cramming" for tests. The frequency and amount of time students log in to the Websites of online courses are behaviors of researchers' common interest (Ahern & Durrington, 1995; Taraban et al., 1999). Researchers also used computers to simulate real problem-solving situations to evaluate the procedural knowledge of students, such as using computer applications in an authentic situation (McManus, 2000) or operating in chemical engineering laboratories (Williams, Hilliard, Smith, Hoo, Wiesner, Parker, & Lan, 2002).

Some researchers (McManus, 2000; Schrum, 1995) assessed learner characteristics and tried to align their instruction to characteristics that would maximize the effectiveness of online instruction. Putting a test bank or homework assignments online to allow students to have multiple attempts to complete tests or homework is a common practice in online courses (Maki & Maki, 2001). Learners' prior experiences in computer-related activities (e.g., e-mail, and Internet), learning style, and quality of social interactions in an online environment were commonly investigated to assist instructors in making instructional decisions and enhance students' satisfaction and motivation in their online learning (Bee & Usip, 1998; Gunawardena & Duphorne, 2001; Mortensen & Young, 2000; Swan, Shea, Fredrickson, Pickett, Pelz, & Maher, 2001; Wells, 2000). Finally, the multiplicity of online evaluation is reflected in the formats of the evaluation. Online instructors do not primarily rely on tests, examinations, and homework assignments to determine students' learning. Questionnaires administered in online courses and correspondences between students and between instructors and students provide instructors with enriched information to evaluate not only what students learn but how they learn. It is worth noting that the content analysis of students' online correspondences (Kanuka & Anderson, 1998; Muilenburg, 2000) is a unique format of evaluation for online instructors. Not only did the researchers demonstrate that analysis of online correspondences revealed depth and effectiveness of students' learning process, they also provided useful references for analysis, such as classifying the content into substantial (relevant to learning) and unsubstantial (irrelevant to learning) categories (Muilenburg & Berge, 2000) or into different levels of knowledge construction (Kanuka & Anderson, 1998).

Benefits of the Seven Helpful Hints

Currently, there are many writers telling us what they used in their classes that they believed worked well. Books are published about how to teach online, but much of the literature we reviewed did not have a foundation based on sound research. Our seven strategies are easy to apply in online courses and are based on empirical evidence that they work well. We hope our work will enhance the experiences of online learners.

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