

REVIEW AND RESOURCES: Online Education Implementation and Evaluation

*Shelley L. Balanko, Ph. D.
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ONLINE EDUCATION

Education has been significantly influenced by the advent of the Internet and the World Wide Web. Through use of these technological advances, learning has become increasingly available “online.” In 2000, the bipartisan, congressional Web-Based Education Commission issued a report on the status of web-based education in the United States (Web-Based Education Commission, 2000). This report described the promise of the Internet for centering learning around students rather than classrooms, tailoring education to the needs and abilities of individual learners, and making life-long learning a practical reality for all. The Commission found that web-based resources enable education to be provided: in places where there is none, where resources are scarce, at anytime and anywhere, for all learners (e.g., pre-kindergarten through grade 12, post secondary, and corporate). Furthermore, web-based education connects people, communities, and resources, and can provide multiple pathways for learning to suit the needs of a diverse group of learners. A notable shortcoming is that web-based education can worsen the divide between those who have access to online learning and those who do not. The Commission appealed to the nation to collectively move the power of Internet learning from promise to practice.

This paper presents a review of the practice of online education with regard to implementation and evaluation. Specifically, this paper aims to: 1) provide a summary of the literature on good practices regarding online education pedagogy and design, and 2) review good practices in the evaluation of online education. Resources for good practices will be provided for both of these areas.

Online education can be very broadly defined. For the purposes of this review, online education will refer to the use of the Internet and the World Wide Web in distance learning, as opposed to the use of these technologies in the traditional classroom. However, some of what is reviewed is likely applicable to face-to-face instructional environments, because the underlying pedagogy and design is more important to student learning than the tools with which education is delivered.

Implementation: Pedagogy and Design

Pedagogy

Online education has been influenced by, or perhaps has influenced, recent trends in the literature away from positivist teacher-centered pedagogy toward constructivist student-centered pedagogy (Burgess, 2001; Knowlton, 2000). With this shift, the focus moves from the teacher transmitting knowledge to students at the teacher's prescribed rate, to a focus on students creating knowledge for themselves at

their own pace. Student-centered pedagogy is sensitive to differences in how students learn; accordingly, material is presented in a variety of ways so students can capitalize on their preferred learning styles. Online technologies lend themselves well to student-centered pedagogy because they can be interactive, permitting student control over the learning process. Furthermore, exposure to online information can be self-paced, and material can be provided in a variety of media (e.g., audio, graphic, textual) to accommodate differences in learning styles (Burgess; 2001).

Educators have been warned about becoming preoccupied with the technological aspects of course design at the expense of attending to pedagogy, desired learning outcomes, and the selection of appropriate learning experiences (Simonson, 2000). One's traditional classroom notes cannot simply be uploaded to a web-site for passive student consumption (Winn, 1997). To inform the restructuring of traditional courses, the Seven Principles for Good Practice in Undergraduate Education can be a useful pedagogical guide for effectively wedding pedagogy and technology in online education (Chickering & Ehrmann, 1997). Chickering and Ehrmann contend that the power of online technologies will only be fully realized if their use is consistent with the Seven Principles. To summarize, the Seven Principles state that good educational practice: 1) encourages contact between students and faculty, 2) develops reciprocity and cooperation among students, 3) uses active learning techniques, 4) gives prompt feedback, 5) emphasizes time on task, 6) communicates high expectations, and 7) respects diverse talents and ways of learning. To the extent that a technological tool promotes these standards, it should be used in online education.

Of the Seven Principles, the first two have received the most attention in the online education literature. It has been deemed unwise to assume online education can be offered effectively with no instructor or peer involvement. Educators have recognized that interaction with humans is key to successful online learning environments (Canada, 2000; Graham, Cagiltay, Craner, Lim, & Duffy, 2000; Morrison & Guenther, 2000; Logan & Conerly, 2001; Palloff & Pratt, 2001; Weiss, 2000). Learning is a social activity, as it is constructed and bound by the context in which it is created (Winn, 1997). Social interaction, inherent in traditional classrooms and essential to learning, is often removed from the online education environment (Knowlton, 2000). Consequently, effort should be directed toward maximizing student interaction with fellow students, with the teacher, and the course material using technological tools (Logan & Conerly, 2001). Interaction and connectedness can be fostered by having students submit biographies and photos for posting on the course website (Weiss, 2000). Extensive use of email communications (Ford, 2002; Jasinski & Thiagarajan, 2000), in-person study groups for students living in close proximity to one another, and course content discussion boards/chat rooms (Morrison & Guenther, 2000) are other means of promoting interaction. Moreover, interactive learning activities (e.g., group projects) (Kochtanek & Hein, 2000), telephone contact, and, if possible, occasional campus visits can create a sense of community among online learners.

The benefits of increasing interaction in online learning are many. For example, Kochtanek and Hein (2000) contend that designing extensive interaction into online courses results in students learning not only from the teacher and material, but from each other as well. Riel and Fulton (2001) argue that online education can have the desirable outcome of creating life-long learning communities. Finally, interaction in online education can increase the likelihood of course completion. Although online learning requires self-direction and initiative, high attrition is risked if students do not feel connected to something more than computer hardware and cyberspace (Knowlton, 2000).

In addition to being given ample opportunities for interaction, students need to be oriented to their new online learning role (Palloff & Pratt, 2001) by being encouraged to take more responsibility for their learning. Students can be better prepared for online learning by requiring registrants to have access to necessary hardware and possess essential computing skills (Canada, 2000). Preparation can also be improved by suggesting students become seekers of knowledge, not just receptacles of information (Canada, 2000). Students can be encouraged to ask more questions, seek more feedback (Roblyer & Ekhaml, 2000), and to adapt courses to fit their own learning styles (Canada, 2000). For example, students who are primarily auditory learners, need to seek out audio information available on the World Wide Web to supplement a text-heavy online course. Likewise, faculty need to be oriented to their new role as facilitator or guide. For instance, faculty should guide students toward supplemental audio or visual materials to aid students' adaptation to online learning. Faculty require support in transitioning to online education through training in technology application, group facilitation, and instructional design (Palloff & Pratt, 2001).

Design

In addition to pedagogical considerations, the fundamental aspects of learning, namely cognitive processes, contextual influences, and social influences, should be considered when designing online education (Winn, 1997). For instance, cognitive ability is constrained due to limitations of human working memory. Working memory functions more effectively when input capacities are not overwhelmed (Vogt, Kumrow, & Kazlauskas, 2001). When input varies in form (e.g., text, sound, and graphics) the mental requirements of a task decrease. Consequently, multi-media presentation of information can optimize the functioning of working memory to improve quantity and quality of learning. The Internet and the World Wide Web are very useful tools for providing information concurrently, in a variety of media.

An educator's pedagogical stance will likely determine the types of online tools used in a course. Those favoring student-centered learning may adopt more interactive tools requiring active learning strategies and more interactions among students and teacher. A teacher-centered approach would be evidenced by greater reliance on passive tools that are equivalent to the face-to-face lecture (e.g., non-interactive web pages). Common online educational tools are web pages that include text, video, and audio components; discussion boards, e-mail, and chat rooms. Currently in development are super-interactive tools such as online laboratories requiring participation from students (Carnevale, 2002; Collins, 2001). An important distinction between online tools is whether a tool is synchronous or asynchronous. Synchronous online tools permit same time or "real time" communication among students and teachers (Belanger & Jordan, 2000). An example is an online chat room. Asynchronous online tools permit communication among students and teachers at different times (Belanger & Jordan, 2000). E-mail and discussion boards are examples of asynchronous tools. There are advantages and disadvantages to all tools, but the desired educational outcomes, not convenience or novelty of the tool, should guide tool selection (Morrison & Guenther, 2000).

Consideration of pedagogy, learning processes, and the appropriateness of technological tools in online education is of primary importance to ensure that the quality, values, and standards of higher education are maintained (Eaton, 2000). Eaton observes that elements of distance education challenge core academic values of higher education. The core values consist of institutional autonomy, collegiality and shared governance, intellectual authority of faculty, the role of the degree in organizing educational

experiences, a broad general education, and site-based education that establishes a community of learning. Carstens and Worsfold (2000) warn that the online classroom may be a threat to liberal learning, student literacy, and student ethics. Bothel (2002) cautions that we should not overestimate the potential of online education. Perhaps, not every course should be offered online. It is important that the

use of technology does not supersede desired educational outcomes as the goal of education. In other words, technology should not be used for technology's sake. Bothel also advises that online education may compromise the enforcement of a student code of conduct. With online education, true identities can be hidden and the ease of cheating is increased. Finally, online education may have a positive bias toward those students with superior computer and telecommunications skills, and education may lose sight of the skills useful in the traditional classroom such as face-to-face human social interaction. To guard against these problems, accreditation standards for online education must be a primary concern as higher education continues to take advantage of the opportunities that distance learning provides (Eaton, 2000; Palloff & Pratt, 2001).

Resources

There are numerous resources available online and in print to help educators design online courses. These resources can help educators define their pedagogical inclinations, select educational experiences that are aligned with pedagogy and desired learning outcomes, and select technologies that will support the theoretical bases of course designs and the values of higher education. In addition to those cited in the text, the following is a collection of resources for good practices in online education implementation:

1. U.S. Department of Education, Office of Educational Technology, Distance Learning: <http://www.ed.gov/about/offices/list/os/technology/distance.html>
2. International Conference on Technology and Education: <http://www.ictc.org/>
3. Multi-Media Educational Resource for Learning and Online Teaching: <http://www.merlot.org/Home.po>
4. Flashlight Program for the Study and Improvement of Educational Uses of Technology: <http://www.tltgroup.org/programs/flashlight.html>
5. The Distance Education and Training Council: <http://www.detc.org/>
6. Innovations in Distance Education, Penn State University: http://www.outreach.psu.edu/DE/IDE/guiding_principles/
7. Distance Education Online Symposium, Penn State University: <http://www.ed.psu.edu/ACSDE/deos/deos.asp>
8. Instructional Technology Council: <http://www.itcnetwork.org/default.htm>
9. The Web of Asynchronous Learning Networks: <http://www.alnresearch.org/index.jsp>
10. New Directions for Teaching and Learning (Journal). Jossey-Bass, Inc.
11. Lessons from the Cyberspace Classroom: The Realities of Online Teaching. Rena M. Palloff and Keith Pratt. Jossey-Bass, Inc.

EVALUATION OF ONLINE EDUCATION

The design and implementation of online education can be guided by evaluation. For instance, evaluation activities can determine educational needs (i.e., needs assessment), how to improve a program/course (i.e., formative evaluation), and whether, or to what extent, a program/course has achieved its desired outcomes (i.e., summative evaluation). Evaluation can also determine whether certain standards are being upheld, and thus, can prove very useful in the accreditation process. Evaluation and instructional design activities can form a cyclical feedback loop where the results of one inform the activities of the other. In this way, online education design and implementation can be continuously improving to meet the needs of an ever-changing learning community. This review highlights some general issues to consider in online education evaluation planning, presents some useful evaluation tools, and provides resources for guiding evaluation practices.

Evaluation Issues

Evaluation Planning

On a macroscopic level, evaluation plans for online education should consider the alignment of learning science principles, practices of instructional design, and the application of online systems (Alley & Jansak, 2001). Evaluation should assess whether continuity has occurred, because alignment of these factors during design and implementation has been identified as good practice. It has also been suggested that three broad elements must be addressed in the evaluation of online education: “the abilities of learners to become involved with course information, manage course information, and process course information” (Powers & Guan (2000), as cited in Armstrong, 2001, p. 1). Obtaining information in these three areas can identify program shortcomings, and thus, these categories can be a good foundation for general evaluation questions. Belanger and Jordan (2000) identify other evaluation questions that are pertinent to distance learning such as 1) What do we get out of distance learning?, 2) Will students be better educated with distance learning, or at least, will they be as well educated as in our traditional learning environments?, and 3) What can we do to increase the likelihood of success in our distance learning programs? Evaluation activities can also be structured around assessment of the following general areas: use of technology, class formats, class atmosphere, quantity and quality of interaction among students and the instructor, course content, assignments, tests, support services, student achievement, student attitude, and the instructor’s influence (Gottschalk, 2002). Finally, Hawkes (1996) suggests that evaluation of online education could be structured around four general criteria: technical (e.g., ease of use, speed of access, graphic realism, audio/video output, and flexibility), instructional (e.g., interactivity, integrative capacity, learner control, learner/instructor attitudes, and learner achievement), technical maintenance (e.g., space/time feasibility, support systems, staff development, and community partnerships), and ethical (e.g., equity in accessibility).

A more focused approach to evaluation of online education could address whether, or to what extent, outcome benchmarks have been attained. Online education benchmarks may include the areas of institutional support, course development, teaching/learning, course structure, student support, faculty support, and evaluation and assessment (Institute for Higher Education Policy, 2000). The Seven Principles for Good Practice in Undergraduate Education could be another set of benchmarks against

which to judge the quality of online education (Chickering & Ehrmann, 1997). Documenting the achievement of benchmarks can be especially useful when undergoing accreditation review. Usability studies are another example of specialized evaluation. A usability study would evaluate online learning for functionality, how it supports the activities that users are required to perform, and whether it is aesthetically pleasing (Mehlenbacher, 2002). Hamel, Ryan-Jones, and Hays (2000) assert that online education evaluation should include assessment of the interface design, navigability, and accessibility (e.g., screen design, page design, site design, and aesthetics) as well as content (e.g., interactivity, content relevance, instructional strategies, and pedagogy).

Evaluation Tools

Whether an evaluation is focused on benchmarks and usability, or structured around general evaluation questions/criteria, a variety of assessment tools are available to gather data. Online courses can be evaluated with quantitative or qualitative methods. Use of the online education system can be tracked resulting in usage statistics, as well as qualitative observational notes. For instance, electronic observations can document frequency, types, and content of online communications (Stacey, 1999). Communications can also be monitored regarding the extent to which course topics are discussed, the depth to which these topics are discussed, and interactivity characteristics of the messages (Beningo & Trentin, 2000). Roblyer and Ekhaml (2000) developed a rubric especially for evaluating interactivity and interaction in distance learning. This rubric is useful for evaluating the social goals of interaction, the instructional goals of interaction, the types and uses of technologies, and the impact of interactivity-changes in learner behaviors.

Traditional evaluation methods are useful in online education environments as well. Participants can be interviewed by telephone, gathered for focus groups (when possible), or surveyed. A pre-designed course evaluation instrument such as the Instructional Assessment System (IAS) Online (Office of Educational Assessment, 2002) is a useful tool for gathering evaluation data. IAS Online is a web-based assessment of post-secondary courses through the Internet. A custom online database is created for the instructional program undergoing evaluation, and users may select standard evaluation items or create new items unique to the course or instructional program. An HTML form is another interesting survey tool for obtaining evaluation data. HTML forms, or surveys, can be built into an online course for immediate feedback regarding the medium, content, format, design, and structure of the course (Hazari & Schno, 1999). Timely interventions can be made to improve online education using this method of evaluation data gathering.

Regardless of the types of evaluation methods employed or the scope of the evaluation plan, evaluation activities should be guided by The program evaluation standards: How to assess evaluations of educational programs, (2nd edition) (Joint Committee on Standards for Educational Evaluation, 1994). The Standards assist evaluators in designing and implementing evaluations that are useful, feasible, appropriate, and accurate. In addition to being of benefit to evaluators, the Standards are helpful for users of evaluation findings to judge an evaluation's quality.

Resources

To aid evaluation of online courses, there are excellent resources available online and in print. These resources can help evaluators define evaluation questions, select methods to evaluate achievement of learning outcomes, determine benchmarks, and utilize technology in the evaluation process. In addition to those cited in the text, the following is a collection of resources for good practices in online education evaluation:

1. U.S. Department of Education, Office of Educational Technology, Evaluation and Assessment: <http://www.ed.gov/about/offices/list/os/technology/evaluation.html>
2. Practical Assessment, Research & Evaluation (Online serial): <http://pareonline.net/Home.htm>
3. Distance-Educator.com: <http://www.distance-educator.com/portals/07evaluators.phtml>
4. Eric Clearinghouse for Assessment, Evaluation, and Research: <http://ericae.net/>
5. American Evaluation Association: <http://www.eval.org/>
6. Distance and Other Educational Technologies Topical Interest Group, American Evaluation Association <http://www.courses.dsu.edu/TIG/default.htm>
7. American Center for the Study of Distance Education: <http://www.ed.psu.edu/ACSDE/>
8. Instructional Assessment System Online. Office of Educational Assessment, University of Washington: <http://depts.washington.edu/oeaias/>
9. The Program Evaluation Standards: How to assess evaluations of educational programs (2nd ed.). (1994). The Joint committee on Standards for Educational Evaluation, James R. Sanders, Chair. Sage Publications, Inc.
10. Evaluation and implementation of distance learning: Technologies, tools, and techniques. (2000). France Belanger and Dianne H. Jordan. Idea Group Publishing.

CONCLUSION

Implementation and evaluation of online education are symbiotic processes. Highly interactive instructional designs that are aligned with student-centered pedagogy form effective online education programs. Evaluation activities that assess alignment of pedagogy, educational activities, and desired learning outcomes, plus address specific issues of usability and benchmark achievement, provide valuable information for continual improvement. In this way, evaluation plays an important role in moving the power of Internet learning from promise to practice. However as promising and powerful as online education may be, it is important to acknowledge potential disadvantages. Warnings of possible problems should not be overlooked such as compromised higher education values, overestimated usefulness of online technologies, and threats to student literacy and student ethics.

Despite these conceivable drawbacks, online learning does have promise as a fast growing form of accessible education. It is wise if educators attend carefully to pedagogy and design when implementing online education. Furthermore, it is essential that evaluation activities inform these practices, as it will result in educational experiences of the highest quality. This review highlights a few of the available resources for good practices in both the implementation and evaluation of online education.

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