Resources for Assessing Instruction and Learning with Technology

Journals of particular note:

- Assessment in Education: Principles, Policy and Practice
- Assessment and Evaluation in Higher Education
- Assessment Update
- Educational Research and Evaluation
- Journal of Technology, Learning, and Assessment
- Journal of the Learning Sciences
- Learning and Instruction
- New Directions for Teaching and Learning
- Studies in Learning, Evaluation, Innovation and Development
- Technology, Instruction, Cognition and Learning

Instruction, Learning, Technology Assessment:

Benbunan-Fich, R., Hiltz, S. R., & Harasim, L. (2005). The online interaction learning model: An integrated theoretical framework for learning networks. In S. R. Hiltz & R. Goldman (Eds.), *Learning together online: Research on asynchronous Learning Networks* (pp. 19-37). Mahwah, NJ: Lawrence Erlbaum.

Although focusing on online interaction, the authors' learning model generalizes to technology-augmented instructional settings. Authors propose four "inputs" (the technology-media mix, the individual student, the instructor, and the group and organizational setting) and five "outputs" (access, faculty satisfaction, student learning, student satisfaction, and cost effectiveness) separated by "learning processes" which includes the "amount and type of interaction/activity, individual vs. collaborative learning, and perceived media sufficiency (richness, social presence/community)" (pp. 23-24).

Biggs, J., Kember, D., & Leung, Y. P. (2001). The revised two-factor study process questionnaire: R-SPQ-2F. *British Journal of Educational Psychology, 71* (1), 133-149.

General model of learning — the Presage-Process-Product (3P) model — that views "student factors, teaching context, on-task approaches to learning, and the learning outcomes" as a "dynamic system" including student factors, teaching context, learning-focused activities, and learning outcomes.

Bransford, J., Brown, A. L., Cocking, R. R., & National Research Council (2000). *How people learn: Brain, mind, experience, and school*. Washington, DC: National Academies P. Available online: http://www.nap.edu/openbook/0309065577/html/index.html

Of particular interest for assessment efforts is the authors' model of instruction (p. 212) influenced by Jenkins' (1978) tetrahedral model. The model emphasizes the nature of the instructional content, teaching and learning activities, and criterial tasks, or the ability of learners to recall and transfer learning.

Broadfoot, P., & Black, P. (2004). Redefining assessment? The first ten years of Assessment in Education. *Assessment in Education: Principles, Policy and Practice, 11* (1), 7-26.

Authors, in their efforts to develop an effective lifelong learning instrument, describe an individual's "learning identity" as "the beliefs, values and attitudes about learning, self and knowledge held by the learner" (p. 249). Article traces the emergence of assessment as a national educational movement, referring to the 1990s as "the assessment era."

Brown, A. L. (1992). Design experiments: Theoretical and methodological challenges in creating complex interventions in classroom settings. *Journal of the Learning Sciences, 2* (2), 141-178.

One of the frequently cited articles on the methodological strengths of a design experiment approach to classroom practice, instructional design, and educational evaluation. Brown is a strong proponent of active learning and social collaborative practices in instruction and the design experiment approach builds these assumptions into its approach.

Brown, R. A. J., & Renshaw, P. D. (2000). Collective argumentation: A sociocultural approach to reframing classroom teaching and learning. In H. Cowie & G. M. van der Aalsvoort (Eds.), *Social interaction in learning and instruction: The meaning of discourse for the construction of knowledge* (pp. 53-66). Kidlington, Oxford: Elsevier Science.

Authors advocate organizing collaborative classroom activities around collective argumentation. A collective argumentation approach to student management includes the following primary tasks: (a) Allocating management of the problem-solving process to the group; (b) Facilitating cooperation between students by reminding them of the norms of participation; (c) Facilitating class participation in the discussion of the strengths and weaknesses of a group's co-constructed argument; (d) Modeling particular ways of constructing arguments; (e) Facilitating class participation in the discussion of the strengths and weaknesses of a group's co-constructed argument; (f) Introducing and modeling appropriate language for different curriculum areas; and (g) Providing strategies for dealing with the interpersonal issues that arise when working with others (p. 53).

Bruce, B. C, & Levin, J. A. (1997). Educational technology: Media for inquiry, communication, construction, and expression. *Journal of Educational Computing Research, 17* (1), 79-102.

Authors present a four-part division of the activities that we engage in when using educational technologies (influenced by Dewey, 1943): inquiry, communication, construction, and expression. In a review of National Science Foundation Applications of Advanced Technologies funded in 1996, Bruce and Levin (1997) found that seventy out of seventy-three of the projects focused on technologies that facilitate inquiry and communication, that three of the projects involved technologies for construction, and that none of the projects involved media for expression. This is not entirely surprising given the 1997 date of the research and most likely continues

to represent the state of educational technology development and use in online learning environments.

Bull, G., Knezek, G., Roblyer, M. D., Schrum, L., & Thompson, A. (2005). A proactive approach to a research agenda for educational technology. *Journal of Research on Technology in Education, 37* (3). Available online: http://www.iste.org/Content/NavigationMenu/Publications/JRTE/Issues/Volume_371/JRTE_37_3/Editorial_A_Proactive_Approach_to_a_Research_Agenda_for_Educational_Technology.htm

Important article for understanding some of the historical complexities involved in the assessment of educational technology practice. The authors summarize problems with prior research efforts and emphasize the need for alternative methodological approaches: "Lack of consensus on research questions and methodologies. For the first twenty years, educational technology research focused on the question: "Is a technology-based method better than a non-technology-based one?" Eventually, this strategy was deemed ill-conceived and unproductive. Yet no more useful paradigm has emerged to take its place. Future research must focus on yet-to-be-articulated research questions."

Chenoweth, N. A., Hayes, J. R., Gripp, P., Littleton, E. B., Steinberg, E. R., & Van Every, D. A. (1999). Are our courses working? Measuring student learning. *Written Communication, 16* (1), 29-50.

This article describes an assessment carried out in collaboration with the administrators of a large freshman English course. The assessment team worked with instructors to identify course goals and to design tasks that the instructors felt would fairly assess the extent to which the students achieved the goals. Students who did and did not take the course were both pre- and post-tested on five central goals: critical reading, argument identification, differentiation of summary and paraphrase, understanding of key terms used in the course, and practical strategies for writing academic papers. Results of the assessment failed to indicate any substantial improvement on any of the five course goals for students who took the course. These results contrasted with positive outcomes obtained by the same assessment team with introductory history and statistics courses. The article concludes with reflections on why instructors may fail to recognize that their courses are not working [AUTHOR ABSTRACT].

Grabinger, S. (2004). Design lessons for social education. In T. M. Duffy & J. R. Kirkley (Eds.), *Learner-centered theory and practice in distance education: Cases from higher education* (pp. 49-60). Mahwah, NJ: Lawrence Erlbaum.

Challenges the assumption that instructional design principles can exist apart from context, content, instructor influence, class personality, dimensions and disciplinary focus of the instructional space. Maintains that it is erroneous to assume that technology is something to be added on afterward, self-contained or, at best, containing, but never interacting with the instructional approach in question. Author notes that the interaction between instructional design and technology can produce surprises, that is, unanticipated outcomes that could not have been discovered before attempting to integrate technology into the instructional situation.

Könings, K. D., Brand-Gruwel, S., & van Merriënboer, J. J. G. (2005). Towards more powerful learning environments though combining the perspectives of designers, teachers, and students. *British Journal of Educational Psychology, 75* (4), 645-660.

Authors recommend that Powerful Learning Environments, or PLEs, should support four high-level stages of the learning process: "First, prior knowledge and experiences of the student must be activated, in order to build new knowledge on pre-existing knowledge. Second, new skills or knowledge must be demonstrated to the student through modeling. Third, the student should have the opportunity to apply their new knowledge and skills. Fourth, the newly acquired skills and knowledge must be integrated into real-world activities of the student" (p. 647).

Marshall, G. (1999). Exploring assessment. *Education and Information Technologies, 4* (3), 313-329.

The relationship between computer technologies, education, and assessment or evaluation has been an historically uneasy one. Author points out, "Our neglect of assessment may be due to the incremental and ad hoc way technology educators have approached curriculum building for technology and our unwillingness to address issues such as what learning theory tells us about ways technology is being used versus the way technology could be used" (p. 315).

Orrill, C. H., Hannafin, M. J., & Glazer, E. M. (2004). Disciplined inquiry and the study of emerging technology. In D. H. Jonassen (Ed.), *Handbook of research on educational communications and technology*, 2nd Edition (pp. 335-353). Mahwah, NJ: Lawrence Erlbaum.

Authors describe the state of the conversation bluntly: "Literally thousands of studies related to computers and learning have been published during the past three decades. The problem has been one of making sense of the enormous, and growing, body of available research" (p. 335). Article summarizes a framework for interpreting the research on learning and instruction with technologies that distinguishes between "foundation" research (psychology, engineering, computer science, information management), "application" research (instructional design, educational technology), and "theory-building" research (learning sciences).

Plowman, L. (2005). Getting the story straight: The role of narrative in teaching and learning with interactive media. In P. Gårdenfors & P. Johansson (Eds.), *Cognition, education, and communication technology* (pp. 55-76). Mahwah, NJ: Lawrence Erlbaum.

Author outlines the critical role that narrative places in educational settings, focusing on the designing effective instructional design of stories. Proves a memorable summary of effective teaching: "Teachers prompt a sense of coherence and understanding in learners by moving between adapting, sequencing, tailoring, and reviewing materials and eliciting, supplementing, and monitoring learners' responses. Teachers use these professional skills to sustain learning discourses and to ensure that classroom activities and processes rarely seem fragmented, although they are manifold and diverse. Ultimately, teachers want to feel assured that learners are getting the story straight" (p. 55).

Quellmalz, E. S., & Kozma, R. (2003). Designing assessments of learning with technology. *Assessment in Education: Principles, Policy and Practice, 10* (3), 389-408.

Authors explicitly connect learning and complex problem-solving using Information and Communication Technologies (ICT). Their model (p. 395) summarizes how general cognitive demands interact with technology knowledge and strategies and the specifics of the technologies being used to accomplish complex problem solving. Technology that supports instruction and learning is distinguished from technology that complicates instruction: "Effects *of* technology are those residual changes in students' cognitive capacity that result form the use of technology to learn. Effects *with* technology are those performances that students display while equipped with a cognitive tool, such as a visualiser, analysis package, or a model builder. From the latter perspective, some cognition is performed by the person and some by the technology that they use…." (p. 291).

Sutherland, R., Armstrong, V., Barnes, S., Brawn, R., Breeze, N., Gall, M., Matthewman, S., Olivero, F., Taylor, A., Triggs, P., Wishart, J., & John, P. (2004). Transforming teaching and learning: Embedding ICT into everyday classroom practices. *Journal of Computer Assisted Learning, 20* (6), 413-425.

The authors describe a multiphase project aimed at integrating teaching design with technological development and married by evaluation and assessment efforts. Observing the range of out-of-school multimedia projects that student routinely engage in, the authors report, "Results of the teacher questionnaire administered to all teachers in the project schools and interviews with partner teachers indicate that the majority of teachers are not aware of the nature and extent of students' expertise that relates to their out-of-school uses of ICT [Information and Communication Technologies]" (p. 418).

van Eijl, P. J., Pilot, A., & De Voogd, P. (2005). Effects of collaborative and individual learning in a blended learning environment. *Education and Information Technologies, 10* (1/2), 49-63.

Well-designed study of collaborative versus individual study in a blended undergraduate English literature class. Teams could be self selected by the students and were composed of four or less students. Thirty-four students elected to work collaboratively (56 percent) and 27 students (44 percent) chose to work individually. Interestingly, higher performing students chose to work collaboratively rather than alone (a significant difference); indeed, and this may have been a result of this preference for collaboration among strong students, the collaborations resulted in higher grades than the individual. Finally, collaboration in the course did not result differences between the groups in terms of time spent on the course, perceived difficulty of the quizzes, coherence and course work, and evaluation of the course. In terms of instructor time committed to either collaboration or individual student work, a trade-off was noted; while group projects result in fewer products to evaluate, group projects also require additional feedback and instructor management.

Citations used in Slides:

Kirsh, D. (2005). Metacognition, distributed cognition, and visual design. In P. Gårdenfors & P. Johansson (Eds.), *Cognition, education, and communication technology* (pp. 147-179). Mahwah, NJ: Lawrence Erlbaum.

Mehlenbacher, B. (2002). Assessing the usability of online instructional materials. In R. S. Anderson, J. F. Bauer, and B. W. Speck (Eds.), *Assessment strategies for the on-line class: From theory to practice* (pp. 91-98). New Directions for Teaching and Learning Series, Number 91. San Francisco, CA: Jossey-Bass.

Mehlenbacher, B., Bennett, L., Bird, T., Ivey, M., Lucas, J., Morton, J., & Whitman, L. (2005). Usable e-learning: A conceptual model for evaluation and design. *Proceedings of HCI International 2005: 11th International Conference on Human-Computer Interaction, Volume 4 — Theories, Models, and Processes in HCI*. Las Vegas: NV: Mira Digital P, 1-10.

Mehlenbacher, B., Miller, C. R., Covington, D., & Larsen, J. (2000). Active and interactive learning online: A comparison of Web-based and conventional writing classes. *IEEE Transactions on Professional Communication, 43* (2), 166-184.

Savery, J. R., & Duffy, T. M. (1995). Problem based learning: An instructional model and its constructivist framework. *Educational Technology, 35* (5), 31-38.

Savery, J. R., & Duffy, T. M. (1996). Problem-based learning: An instructional model and its constructivist framework. In B. G. Wilson (Ed.), *Constructivist learning environments: Case studies in instructional design* (pp. 135-148). Englewood Cliffs, NJ: Educational Technology Publications.

Simon, H. A. (1979). *Models of thought*. New Haven, CT: Yale UP.