

Interactivity: Key to CLS Online Instruction

WILLIAM B ZUNDEL

Learning is the attainment and application of knowledge or skill. Effective online instruction should integrate interactivity. Online interactivity 1) includes a message loop, 2) occurs from the learner's point of view, 3) provides for content and affective outcomes, and 4) is mutually coherent. These characteristics must be woven into online interactive devices such as discussion boards, PowerPoint™ slides, email, and chat rooms to insure learning. Interactivity must be consistent with the course objectives. Increased interactivity enhances learning in online courses just as it does on campus.

INDEX TERMS: distance education; interactivity; online instruction.

Clin Lab Sci 2006;19(2):122

William B Zundel MS is Associate Professor of Clinical Laboratory Sciences at Weber State University, Ogden UT.

Address for correspondence: William B Zundel MS, Associate Professor, Clinical Laboratory Sciences, Weber State University, 3905 University Circle, Ogden UT, 84408-3905. (801) 626-8133, (801) 626-7508 (fax). bzundel@weber.edu

Yasmen Simonian PhD is the Focus: Educational Technology guest editor.

Focus Continuing Education Credit: see pages 127 to 128 for learning objectives, test questions, and application form.

The following paper was presented at the Clinical Laboratory Educators Conference, February 2005 in Williamsburg VA.

The Focus section seeks to publish relevant and timely continuing education for clinical laboratory practitioners. Section editors, topics, and authors are selected in advance to cover current areas of interest in each discipline. Readers can obtain continuing education credit (CE) through P.A.C.E.® by completing the tearout form/examination questions included in each issue of Clin Lab Sci and mailing it with the appropriate fee to the address designated on the form. Suggestions for future Focus topics and authors, and manuscripts appropriate for CE credit are encouraged. Direct all inquiries to the Clin Lab Sci Editorial Office, IC Ink, 858 Saint Annes Drive, Iowa City IA 52245. (319) 354-3861, (319) 338-1016 (fax). ic.ink@mchsi.com

This article describes the intimate relationship between interactivity and instruction. Dick and Carey define instruction as "the systematic process in which every component; (i.e. teacher, students, materials, and learning environment) is crucial to successful learning."¹ Instruction is more than the dissemination of information. Instruction occurs when all factors work together to facilitate learning: the attainment and proper application of knowledge and/or skill.

Interactivity is not simple. There are a multitude of interactive processes in a face-to-face classroom: lectures, questioning, laboratory exercises, case studies, and non-verbal cues. Do we apply interactivity with online instruction as with face-to-face instruction? Online interactivity can include all of the above through formats such as email, discussion boards, and chat rooms.

Interactivity has several definitions.²⁻⁸ In "Interactivity Demystified: A Structural Definition for Distance Education and Intelligent CBT" Michael Yacci discusses four essential characteristics:⁹

1. Instructional interactivity is a message loop.
2. Instructional interactivity occurs from the learner's point of view.
3. Instructional interactivity has two outputs: content learning and affective benefits.
4. Messages must be mutually coherent.

MESSAGE LOOP

Instructional interactivity is a message loop. Online interactivity is a circuit of messages flowing from an originating entity to a target entity and back. Entities can be students, instructors, computers, or other media capable of receiving and sending messages. For example, when a teacher posts a question on a discussion board and a student answers, the loop has been completed, but from whose perspective?

A STUDENT'S POINT OF VIEW

Instructional interactivity must occur from a student's perspective. In the example the loop was complete for the teacher, but what about the student? If the student does not receive feedback the loop is incomplete. Did instruction oc-

cur? Think for just a moment how this would play out in a classroom: An instructor poses a question. A student answers and the instructor moves on with disregard for the response. The effect is the same for online instruction. Our challenge is to ensure the message loop is complete from the student's point of view, and to make appropriate changes.

CONTENT LEARNING

Content learning is purposeful learning directed toward an instructional goal or objective. Wagner writes, "When focusing upon interaction outcomes rather than interaction agents, interactions can more effectively serve as a means to the ends of learning and performance improvement. In this context interactivity has two purposes: it must change the learners and it must move learners toward an action state of goal attainment. By emphasizing the outcome of an interaction, it is easier to see the impact that an interaction has on learners."² Interactivity should lend itself to achieving the course objectives. For example, discussion board questions or case studies must be written at the same cognitive level as the course objective from which they are written.

Figure 1. Sample interactive PowerPoint slide

Antigen/Antibody Reactions

- | | |
|----------------|---|
| • Antigen | • Substance capable of eliciting an immune response when introduced to an immunocompetent individual to whom it is foreign. |
| • Antigenicity | • Ability of antigen to react with the products of a specific immune response. |
| • Epitopes | • Antigenic determinants – structural parts of the antigen with which the antibody can combine. |

The content on the left side of the slide comes up first, all at once. The student is instructed to answer or define the content. Then the content on the right hand side of the slide comes up one at a time at the student's own pace to confirm their answers.

AFFECTIVE BENEFITS

Affective benefits are defined as emotions and values toward instructional objects that are amplified. We hope for amplification of learning through social interaction with the faculty and other students in the course. Students on campus get to know each other and interact socially by forming study groups, discussing how to prepare for exams, and in cramming for exams. The same social interactions among online students can be coordinated through collaboration projects or discussion boards, thus enhancing the achievement of learning objectives.

MUTUAL COHERENCE

Mutual coherence describes the relationship between a message and its response. The content of both the outgoing and returning messages must be considered if we are to make sense of an interaction. Mutual coherence labels the shared meaning between both messages in an interaction. Interactions with low mutual coherence are easy to spot. For example, an interaction with zero mutual coherence goes something like this. Student: "I feel lost in this course." Teacher: "I love to watch college football."

An interaction with very low mutual coherence might sound like this. Student: "I feel lost in this course." Teacher: "The midterm exam for this course is really hard."

An interaction with high mutual coherence might be: Student: "I feel lost in this course." Teacher: "People often feel lost in an online course."

Yacci mentions that while it is difficult to specify the "meaning" of messages; he believes the extent of the shared meaning connecting messages influences the perceived degree of interactivity.⁹ If a student does not feel a connection with the faculty or content of an online class, he or she will feel that the interactivity is not worth the effort.

PERSONAL EXPERIENCE WITH ONLINE INTERACTIVITY: EMAIL

Email is used extensively in my online courses. The course syllabus outlines specifically what is expected from both the faculty and the students: email is to be checked every day except Sunday and a 24 hour response time is expected. We also establish which email account both faculty and students will use during the semester.

Email promotes the discussion board. Many students email questions that represent a need of the class. I email back

that I will answer the question as soon as the student posts it in the discussion board for all to see. I also use email for the students' personal needs. Email is private, so students can address personal issues. Finally, email is very good for sending attachments to and from students such as antibody identification panels and case study assignments. I also archive all of my online course email, both sent and received, for documentation and follow-up purposes.

MICROSOFT POWERPOINT

What online instructor does not use Microsoft PowerPoint for some aspect of online instruction? Is it interactive? Figure 1 shows a common format I use. Microsoft Producer for PowerPoint enables the addition of audio or video to any PowerPoint presentation. Several faculty members at Weber State University have added audio to each PowerPoint slide in their online course lectures. We burn our course audio lectures onto a CD-ROM which is sent to each online

student in the course. Each student has essentially the same lecture that is presented on campus. It is an arduous process that begins with a written script for each slide in the lecture using the "Notes" function in PowerPoint. Then we capture the audio with a microphone connected directly into a desktop computer. The audio is imported into Producer, which enables synchronization of the audio with the content of the corresponding PowerPoint slides. Each lecture takes approximately six to eight hours. The following are just a few of the comments from online students regarding the addition of audio to the online lectures:

"...this is the best format of a class, online especially, that I have ever had and I am SO APPRECIATIVE of the time and effort you put into this class! I've been going along on your lecture and I just keep thinking how awesome this is! This is BETTER than an on campus class because it is 2 a.m. (I study when the baby sleeps) and I can pause you as much

Figure 2. Sample conversation between two enrolled students demonstrating affective benefits of course discussion board

Topic: Introduction Subject: Re:intro to 3311 Hi! I live in Hackettstown about 35 miles before the Delaware Water Gap. When I first moved in here there were so many meadows and cornfields. Now home developments are just everywhere. I missed the cows mooing in the morning or evening. Nice meeting you! I hope we can help each other out for this course. Are you taking another course besides Blood Banking? Take care Reply Forward	Date: September 1, 2004 7:53 PM Author:
Topic: Introduction Subject: Re:intro to 3311 Guess were I grew up? Port Murray. just doen the road. And my first apartment was at Mansfield Apts. Right on RT. 57, in Hackettstown.. I went to Warren Hills high in washington. I had a lot of friends and family that live in hackettstown. I am also taking cls-4414. I grew up on a farm, and had many a morning that i heard the cows! Some times I miss it. But with the taxes in Mansfield township, it's cheaper to live here let me know whats going on Reply Forward	Date: September 1, 2004 11:44 PM Author:
Topic: Introduction Subject: Re:intro to 3311 Oh my Gosh, what a small world!! I live what used to be Mr. Allen's meadow on Allen Rd. by ShopRite. It is now a huge development with very high property taxes. We've only been in this new house for three years but before this we used to live up the block on Hillside Ter W on Sunnyview development. My kids now go to Warren Hills HS and MS. My oldest is on 11th grade and my second is on 8th. More stores and shops had been added in the neighborhood within the last five yrs so nothing looks the same anymore. KMart mall is now gone and Lowe's had taken over plus two new restaurants. How long have you've been gone from here? I hope we'll stay in touch even after this class. I would definitely need your input on some of the classes that you've taken already. This will help me a lot with my fear of not being able to make it through! Let me know when you come for a visit. Stop by and see me! Reply Forward	Date: September 2, 2004 3:35 PM Author:

as I want and take as long as I want to take in the information!"

"The materials and the audio are very well presented. I've had few online classes before but definitely yours is a lot better. It really makes the student feel that they're in a traditional classroom except I can hit the replay button even more than once until I get it!"

"I wanted to let you know that I received the course CD-ROM a few days ago. I have already done the first lecture and I must say I think this is going to be the greatest tool yet in the online courses. It was easy to follow and a great tool."

In a recent evaluation of an online course, 95% of students were satisfied with the technology that was used to deliver the course (e.g., audio CD-ROM).

DISCUSSION BOARD

A discussion board is a general term for any online bulletin board where one can post and expect to see responses to messages. The following all apply to the functionality of the discussion board:

1. The first assignment is faculty and student introductions. Everyone introduces themselves. This allows everyone to get to know each other and creates the affective benefits as previously discussed. Figure 2 is a conversation between two students. The introduction immediately creates a sense of unity and empathy.
2. Faculty and student content questions are posted in designated discussion board topics each week relating to the lecture topic.
3. A pre-test review is posted wherein students can ask questions and get a feel for what the exam or quiz covers. The post-test follow-up includes the mean, high/low on the test, and a review of content trouble spots. It allows students to follow up on test questions they did not understand or with which they had an issue.
4. The discussion board is used for peer interaction. Often online students are currently working

in a blood bank. I give them the assignment to follow up on the question and answer session questions. Students report individual and collaborative course projects with appropriate feedback from peers and faculty.

5. Case studies are developed and presented by groups or pairs using the discussion board. Different cases are assigned to each student to be reported and critiqued.

INSTRUCTIONAL OUTCOMES

There are no instructional outcome studies that measure online interactivity. Perhaps there are so many variables it is hard to conclude a specific interactive process enhanced the cognitive process. Most authors believe that there is a direct correlation, which has been my experience. Figure 3 records the times a student has entered the website or discussion board. Those students with the most interactions had the highest scores. That has been consistent with every online course I have taught.

Design is one more characteristic of effective online interactive instruction. Interactivity must be designed into instruction and be consistent with the course objectives.

Thomas Edison once said, "Opportunity is often missed because it is dressed in coveralls and looks a lot like work." Online instruction in laboratory medicine is in its infancy, and we have an opportunity to greatly impact the industry through the development of quality online instruction. Online instruction doesn't just happen. It requires work to design and develop interactive courseware that enables students to become effective professionals.

Figure 3. Ledger of a student's activity level on course web site and discussion board

Sessions	Total time	Mail		Discussions	
		read messages	sent messages	read messages	posted messages
224	13:17:59	1	2	1491	23
163	36:17:56	36	16	3860	24
129	26:40:56	0	0	1511	28
155	21:31:49	25	4	1975	20
153	23:19:35	15	1	2065	30
8	02:37:12	0	0	65	3
121	29:07:12	15	12	2319	26
39	12:32:16	2	0	392	15
23	02:25:26	1	1	114	0

REFERENCES

1. Dick W; Carey L. The systematic design of instruction. 2nd ed. Harper Collins; 1996.
2. Wagner ED. Interaction strategies for online training designs. Paper presented at the Proceedings of Distance Learning: 14th Annual Conference on Distance Teaching and Learning (pp.417-21); 1998; University of Wisconsin system, Madison WI.
3. Shortridge AM. Interactive web based instruction: What is it? And how can it be achieved? [Internet]. Journal of Instructional Science and Technology 2002;4. <http://www.usp.edu.au/electpub/e-jist/>. Accessed Jan 2005.
4. Muthu Kumar SL. A critical discourse in multimedia design: A pedagogical perspective to creating engaging online courseware. E-Journal of Instructional Science and Technology, 2004;7(2). Accessed Jan 2005.
5. Bills CB. Effects of structure and interactivity on internet-based instruction. Paper presented at the Interservice/Industry Training Simulation and Education Conference; Dec 1-4 1997; Orlando FL.
6. Geer R. Drivers for successful student learning through collaborative interactivity in internet based courses. Paper presented at the Society for the Information Technology and Teacher Education International Conference; 2000; San Diego CA.
7. Chih-Hsiung T. Strategies to increase interaction in online social learning environments. Paper presented at the Society for the Information Technology and Teacher Education International Conference; 2000; San Diego CA.
8. Vargo, J. Evaluation of the effectiveness of internet delivered coursework [Internet]. <http://ausweb.scu.edu.au/proceedings/vargo/paper.html>. Accessed Jan 2005.
9. Yacci M. Interactivity demystified: A structural definition for distance education and intelligent CBT. Educational Technology August 2000.

POSITION ADVERTISEMENT

University of Cincinnati College of Allied Health Sciences, Clinical Laboratory Science/Medical Technology Program Faculty Position

The Clinical Laboratory Science/Medical Technology Program, College of Allied Health Sciences, University of Cincinnati is filling a full-time faculty position in Clinical Laboratory Science/Medical Technology. The successful candidate will participate in all aspects of the CLS/MT Program. This is an exciting opportunity to join enthusiastic faculty members in a program that offers a wide range of resources and opportunities that are available through the department and the medical center in which it resides. Responsibilities include but are not limited to instruction of didactic, laboratory, clinical, and distance learning courses; participating in and assisting with administrative duties such as accreditation, curriculum design and revision, and developing program policy; student recruitment, admissions, and advising; and participation in service and scholarship. The ideal candidate for this position will be academically prepared with a doctoral degree. However, those individuals holding a master's degree with exceptional clinical and teaching experience will be considered. Qualifications include: Certification by ASCP, NCA, or an equivalent agency; minimum of five years experience as a CLS/MT; minimum of five years teaching experience in CLS/MT courses or in a CLS/MT program; and a working knowledge of NAACLS accreditation guidelines. Academic rank will be dependent on qualifications. Salary is competitive and commensurate with credentials and experience.

Applications: Candidates should submit a letter of interest (noting control #925N), curriculum vitae, and names of three current professional references with complete contact information to Linda J Graeter, PhD, Department Head, Department of Analytical and Diagnostic Sciences, University of Cincinnati, College of Allied Health Sciences, PO Box 670394, Cincinnati OH 45267-0394 or via email to linda.graeter@uc.edu. Applications will be accepted until the position is filled.

The University of Cincinnati is an affirmative action, equal opportunity employer; minorities, women, disabled persons, Vietnam era and disabled veterans are encouraged to apply.