# Faculty Members Acceptance of Web-based Education

VICKI S FREEMAN, DAVID HOLCOMB, JEAN BRICKELL
KAREN CHANDLER, PHYLLIS MUELLENBERG

OBJECTIVE: To assess the effect of the WebCLS project on clinical laboratory science (CLS) faculty members including improvement of participating CLS educators' skills in designing, developing, delivering, and evaluating interactive, Web-based instructional programs.

DESIGN: A survey was developed that included 24 statements related to respondents' perceptions of how their participation in the project: a) improved their course development skills, b) developed their evaluation skills, and c) affected them personally. Four open-ended questions asked the respondents to comment on the project's effect on their traditional course development skills, plans for future usage of WebCLS-produced course materials, the most beneficial outcomes of their participation, any problems that participation in the project caused them, and any unexpected positive or negative outcomes that could be attributed to their participation.

SETTING: The survey was sent to 27 individuals who had participated in the project.

RESULTS: Twenty-four participants completed the survey for an 89% response rate. The mean response was 6.82 (S.D. 2.32) with sixteen respondents' (73%) reporting participation at the mean or above.

CONCLUSION: Overall, the WebCLS project accomplished its objective of improving CLS educators' Web-based, distance education course development skills. One of the most positive outcomes of the project was the survey respondents' belief that their participation in the project expanded their contacts with colleagues in CLS education as well as with instructional design experts, computer programmers, and other technical support personnel. Furthermore, this outcome prompted several participating faculty to report that this enhanced collegial relationship will sustain their interest in curriculum development over time.

ABBREVIATIONS: CLS = clinical laboratory sciences; WebCLS = Web-based education in clinical laboratory sciences.

INDEX TERMS: clinical laboratory sciences; faculty; Web education.

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*Vicki S. Freeman, PhD, CLS(NCA) is Professor at University of Texas Medical Branch, Galveston TX.*

*David Holcomb EdD is Professor at Baylor College of Medicine, Houston TX.*

*Jean Brickell EdD is Associate Professor, University of Kentucky, Hogard KY.*

*Karen Chandler MA CLS(NCA) is Associate Professor, University of Texas-Pan American, Edinburg TX.*

*Phyllis Muellenberg MA is Associate Professor, University of Nebraska Medical Center, Omaha NE.*

*Address for correspondence: Vicki S Freeman, Professor and Chair, Department of Clinical Laboratory Sciences, School of Allied Health Sciences, University of Texas Medical Branch, Galveston TX 77555-1140. (409) 772-3056, (409) 772-9470 (fax). vfreeman@utmb.edu*

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Distance education, as a method of delivering education to students away from campus, is not a new concept. According to Garrison, correspondence lessons have been offered for over 250 years.[1] However, Hirth, Freels, and Patten wrote that a major increase in distance-learning occurred during

the late 1980s.[2] As distance-learning offerings have increased, the method of delivery for these offerings has changed dramatically. Garrison wrote that the delivery systems of distance-education have changed.[1] What were initially correspondence courses became courses delivered by telecommunications; now many of these courses are delivered via a combination of telecommunications and computer technology including the Internet.

Cairncross suggested that for students "there is no best medium for learning and in an ideal situation a range of media should be provided".[3] If used to its full potential, new technology can allow the instructor to move toward more individualized types of learning. This will benefit the learner and allow for increased opportunities for learner interaction. The new technology shifts the responsibility of the learning from the instructor to the student. The role of the instructor then changes from that of an information-provider to one of a facilitator, organizer, and monitor.[4] This change is threatening for the faculty members who have spent most of their careers providing content to the students.

Gehlauf, Shatz, and Frye found that although instructors believe different audiovisual materials and student interaction are more effective, they cling to traditional methods such as lectures and overhead transparencies.[5] Justification for faculty members' attitudes lies in research done by Parkinson and Parkinson.[6] They wrote that instructor effectiveness, organizational presentation, student motivation, objective clarification, learner promotion, and objective satisfaction were all rated lower by interactive television students than by traditional students. However, Denton, Clark, Rossing, and O'Connor, as well as Parkinson and Parkinson, found no difference between exam scores of traditional classroom students and interactive television students.[6,7]

Research has found that the success of a new technology is determined largely by faculty members' attitudes toward it.[8,9] Cairncross wrote "an important factor in determining how widely a particular technology will be employed is the acceptance of the teachers who will be expected to implement it", while Hawkes and Coldeway suggested that "a more involved faculty approach results in a serious investment and ownership in the course".[4,10] In the past, the introduction of new instructional technologies has been accompanied by little attention to faculty members' needs. In many instances, participating faculty members have not been given instruction in the proper use, the benefits, and the characteristics of the technology. Often faculty members receive no guidance on which instructional methods work well with the various kinds of technology.[11] Implementation of new technology in distance-learning requires planning and training to secure faculty members' commitment.

## BACKGROUND

The primary goal of the Web-based Education in Clinical Laboratory Science (WebCLS) project was to develop, implement, and evaluate an interactive Web-based curriculum model for baccalaureate level CLS education. This project was funded through a grant from the U.S. Department of Education, Funding for the Improvement of Postsecondary Education, Learning Anytime, Anyplace Partnerships. The three-year WebCLS project was a collaborative effort involving participants from ten institutions in five states to create an online baccalaureate degree program in clinical laboratory science. The WebCLS project built on a partnership model that brought together national leaders from CLS and clinical laboratory technician (CLT) programs around the country and involved them in the design, development, and implementation. The partners included four baccalaureate-level CLS programs, three associate-degree CLT programs, an instructional technology program, and two partners to assist in dissemination of the developed materials. These partners brought strong expertise in distance and Web-based education, sensitivity to multicultural issues, awareness of rural, community health issues, and knowledge of the laboratory community.

Discipline-specific faculty members from the partnering institutions served as content experts on the project and identified the teaching strategies and competencies to be taught using the National Accrediting Agency for Clinical Laboratory Sciences Essentials and the American Society for Clinical Laboratory Sciences Body of Knowledge.[12,13] Expert teams from the CLS and CLT institutions worked together to determine the course content and to develop specific modules. Partnership with an institution known for its instructional technology expertise brought in experts from the field of instructional design and Web delivery. Training experiences provided by instructional technology specialists guided the faculty members in the collaboration, development, and delivery of these courses. The training built on the systemic approach to training educators in the design of interactive, student-centered distance-learning environments.[14,15]

The Systematic Instructional Design Model, promoted by Dick and Cary, involves a systems approach that focuses on what the learner is expected to be able to do at the completion of instruction.[16] This approach connects the instruc-

tional strategy to the desired learning outcomes and provides linkages between each component in the model. The nine components of the Dick and Carey model are: 1) goal identification, 2) instructional analysis, 3) learner and context analysis, 4) definition of objectives, 5) assessment instrument, (6) instructional strategy, 7) materials development, 8) formative evaluation, and 9) summative evaluation of instruction. By following this model in the development of the WebCLS course models, the teams were able to follow a consistent development process.

Instructional technology experts worked with the groups to ensure appropriate and effective design and to provide formative course evaluations. Programmers and graphic designers worked with the teams to develop the course materials. Project effectiveness was determined using formative and summative evaluation techniques. During development, course effectiveness and efficiency were assessed through a series of formative evaluations and usability tests. Overall, project effectiveness was evaluated using benchmark criteria that delineated acceptable outcomes as perceived by the project's leadership.

## METHODS

This paper addresses the effect of the project on CLS faculty members including improvement of participating CLS educators' skills in designing, developing, delivering, and evaluating interactive, Web-based instructional programs. Acceptance and support of faculty members were essential to the success of the WebCLS project; therefore, faculty members' evaluation of WebCLS courses was a part of the curriculum development process. As described above, faculty members assessed each WebCLS course for quality, access, and acceptability.

Participants evaluated WebCLS faculty members' training activities for overall quality, effectiveness of teaching strategies, and degree to which workshop objectives were accomplished. Furthermore, using a WebCLS Project-developed survey form, trainees evaluated their own confidence in their abilities to participate effectively in WebCLS activities.

### Evaluation

A survey was developed with input from the WebCLS project's leadership team to assess the overall effect of the project on participating CLS faculty members. The survey was designed to address the following evaluation questions:

1. Did the WebCLS project affect participants' Web-based, distance education curriculum development, teaching, and evaluation skills?
2. Did the participants value the training they received in systematic instructional design?
3. Did the WebCLS project improve participants' traditional course development and teaching activities?
4. Did participants report using, or planning to use, courses and instructional materials generated by the WebCLS Project?
5. What did the participants believe were the most beneficial outcomes of the WebCLS project?
6. What problems did the WebCLS project cause participants?
7. Were there any positive or negative unexpected outcomes that could be attributed to participation in the WebCLS project?

The first section of the survey included 24 statements related to respondents' perceptions of how their participation in the WebCLS project: a) improved their course development skills, b) developed their evaluation skills, and c) affected them personally. The survey respondents were asked to use a Likert scale of 5 = strongly agree to 1 = strongly disagree with 3 = uncertain, and 6 = not applicable after reading each statement.

Four open-ended questions asked the respondents to comment on plans for future use of WebCLS-produced course materials, the most beneficial outcomes of their WebCLS participation, any problems that participation in the WebCLS project caused them, and any unexpected positive or negative outcomes that could be attributed to their WebCLS participation.

## RESULTS

The WebCLS faculty survey was sent via email to 27 individuals who had participated in the project. After three requests for responses, 24 participants completed the survey for an 89% response rate. The respondents were asked to rate their participation level in project activities on a scale of 1 to 10 with 1 = very inactive participant to 10 = very active participant. The mean response was 6.82 (s of 2.32) with 16 respondents (73%) reporting participation at the mean or above.

### Effects of project participation

Table 1 presents summary data on the respondents' agreement with statements regarding how WebCLS affected them. For reporting purposes, strongly agree and agree responses were combined when calculating percentages.

The only statement that received 100% agreement was that "my participation in WebCLS has expanded my contacts with colleagues in CLS education". Other statements that received agreement from most of the respondents, i.e., greater than 90% of the respondents, were as follows:

Table 1. Responses to statements regarding how WebCLS affected the respondents (n = 24)

| My participation in WebCLS has:* | % Agree† | Mean‡ | s |
|---|---|---|---|
| Expanded my contacts with colleagues in CLS education. | 100 | 4.50 | 0.51 |
| Made me more aware of technological advances in CLS education. | 96 | 4.38 | 0.58 |
| Enhanced my appreciation of well-planned instruction. | 91 | 4.35 | 0.61 |
| Expanded my view of CLS curriculum development. | 91 | 4.25 | 0.48 |
| Been a worthwhile endeavor. | 79 | 4.18 | 0.66 |
| Improved my course development skills. | 84 | 3.83 | 1.58 |
| Increased my ability to integrate technology with instruction. | 79 | 3.82 | 1.37 |
| Made me more learner-centered in my teaching activities. | 74 | 3.64 | 1.33 |
| Made me more computer 'savvy'. | 71 | 3.63 | 1.28 |
| Frustrated me because of slow production of WebCLS courses.§ | 63 | 3.52 | 1.24 |
| Made me a better instructor. | 71 | 3.46 | 1.50 |
| Made me a better self-evaluator of my teaching. | 70 | 3.38 | 1.44 |
| Inspired me to develop more curriculum/courses via the systematic instructional design method. | 70 | 3.32 | 1.64 |
| Garnered positive recognition of my efforts by my colleagues. | 54 | 3.30 | 1.33 |
| Changed my teaching strategies. | 59 | 3.25 | 1.54 |
| Validated that I am teaching appropriate CLS material. | 70 | 3.09 | 1.91 |
| Inspired me to help faculty members improve their teaching skills. | 50 | 2.78 | 1.73 |
| Improved the overall CLS program at my institution. | 37 | 2.74 | 1.67 |
| Made me a better evaluator of student performance. | 33 | 2.63 | 1.50 |
| Allowed me to increase the amount of content I include in my course. | 21 | 2.35 | 1.34 |
| Caused problems for me with my supervisor.§ | 8 | 1.91 | 1.08 |
| Led to a salary increase for me. | 8 | 1.48 | 1.34 |
| Distracted me from what is really important in my teaching activities.§ | 4 | 1.75 | 1.03 |
| Led to my promotion in academic rank. | 12 | 1.17 | 1.53 |

* = Statements ranked by mean responses
† = Represents the sum of percentages of "strongly agree" and "agree" responses
‡ = presents mean of responses on 5 point scale where 5 = strongly agree; 4 = agree; 3 = uncertain; 2 = disagree; 1 = strongly disagree; and 6 = not applicable.
§ = negatively worded items.

- Made me more aware of technological advances in CLS education.
- Enhanced my appreciation of well-planned instruction.
- Expanded my view of CLS curriculum development.

A strong majority (84%) of the respondents also agreed that their participation in WebCLS generally improved their course development skills. In addition, 79% agreed that their abilities in integrating technology in their instructional strategies were improved. Although a majority of the respondents agreed with the statements listed below, there was some uncertainty in their responses to several items with the mean scores ranging from 3.64 down to 3.09.

- Made me more learner-centered in my teaching activities.
- Made me more computer savvy.
- Made me a better instructor.
- Changed my teaching strategies.
- Inspired me to develop more curriculum/courses via the systematic instructional design method.
- Validated that I am teaching appropriate CLS materials.
- Gained positive recognition of my efforts by my colleagues.

The respondents disagreed with several statements regarding the WebCLS project's effect on them. Although the project did help two respondents obtain academic promotions and three respondents receive salary increases, the remaining respondents' academic ranks and salaries were not affected by their participation. Additionally, the majority of the respondents felt that their WebCLS participation did not improve the CLS programs at their institutions, nor did it allow them to increase the amount of content they included in their courses. Although the respondents generally agreed that they were frustrated by the slow production of WebCLS courses, they did not believe that their participation in the project caused any problems for them with their supervisors; nor did it distract them from their important teaching activities. Finally, 79% of the respondents agreed that overall their participation in WebCLS activities had been a worthwhile experience.

### Use of WebCLS course materials

Eighteen respondents (75%) reported that they were currently using, or were planning to use course materials generated by the WebCLS project to enhance their traditional CLS curriculum. Some specific examples of usage of the WebCLS materials are listed below:

- Hopefully I will incorporate the lessons into present curriculum to decrease actual lecture time, and also use (the materials) as an assigned review module in areas students traditionally have problems understanding.
- I have used two components of the WebCLS course that have been programmed to reinforce classroom teaching as well as to introduce technologic skills I am not able to teach in our student labs.
- I will be using most of the modules from the microbiology section in a new course. This will be the second micro course for traditional students and the only course for MLT to MT articulation students.
- I plan to use some (materials) as an end of course review and perhaps some of the review lessons to move fast-paced students through a shorter course. Those that already have experience and a bachelors degree should be self-disciplined enough to handle Web-based instruction as part of an existing course.
- We plan to use the course material for MLT to MT curriculum plan.
- Selected units will be used for continuing education and re-training of personnel who have been out of the field for many years.
- Selected courses/units will be incorporated into existing curriculum with appropriate credit being given to grant supported projects.
- The materials will be used to teach specific components of my courses, to enhance specific pieces, and some as extra activities for students who need the extra reinforcement.
- I plan to use all of the units to enrich the on-campus courses. The on-campus courses will be taught as distance courses for chemistry and management.
- Images will be used in PowerPoint™ presentations for lecture and student review sessions. Individual lessons will be incorporated into course materials for students to use (assignments).
- Incorporated the components of the hemostasis course into my traditional coagulation course this semester.
- Distance education students and to teach the thought process that formerly was taught on the 'bench'. With staffing shortages, CLS educators need to be more efficient with the clinical faculty's time and efforts. WebCLS can offer laboratory thought-process simulations. Hopefully, learners will be more prepared to enter the clinical laboratory phase of their education after completing some of these problem-solving exercises.

### Most beneficial outcomes of WebCLS participation

The respondents reported several benefits to their WebCLS participation, including networking with colleagues, expanding knowledge of CLS education, learning and improving collaboration skills, and learning the Systematic Instructional Design Model. Below are some specific responses to this statement:

- Opportunity for faculty (members) to participate in training sessions and team curriculum development. Exchange of ideas regarding curriculum content appropriate for CT/MLT to CLS/MT education. My faculty (members) have increased confidence in their ability to develop, revise, and deliver web-based curriculum.
- Application of the systematic design of instruction to an actual course! Working with other CLS/CLT faculty members and staff from around the country and learning how to manage/lead a group of people. Using distance education technologies to develop the courses.
- Remembering to 'begin with the end in mind'.
- Learning the systematic design process and working in groups to assess development for input from various educators. Learning more about the Web and software that includes tools such as bulletin board and chat.
- Gained better insight into the positive and negative influences in collaborative research and development efforts. In a perfect world, I think that the instructional design process would provide a means of increasing effectiveness of teaching and learning. I think some of the things that I have learned, at least well enough to utilize, have helped me in thinking about how I teach and how I might better achieve my goals.

### Problems caused by WebCLS participation

Responses to the question regarding problems that were caused by their WebCLS participation were primarily focused on the lack of time to devote to the project concurrently with maintaining a full-time commitment to their home campuses. Some example responses were as follows:

- There never seemed to be enough time to do everything that I wanted to. There were always increasing demands at work and it was a battle getting release time from administration.
- I did not feel I could give this course adequate attention due to other responsibilities. Wish I could have worked on this full time to strengthen my part of the program and to complete it in a shorter amount of time.
- The attempts at collaboration were very frustrating. There were times that I felt that WebCLS was the all-consuming effort of the department and that the current students suffered somewhat from our drive to complete tasks.
- Required too much time vs. outcome. Collaborative required too many people to agree on outcomes that were more personal preferences rather than actual learning requirements. Release time was not sufficient and grant money for salaries on the project were not sufficient for institutions to recognize time spent and get additional help at institution to allow individuals to work consistently and continuously on the project in between meetings.
- There was never enough time to work on WebCLS when I was at my own institution. MLT Programs, including mine, do not have adequate faculty (members) to cover release time from teaching and administrative responsibilities at the home institution.

Other specific responses regarding problems were as follows:

- Stress and anxiety over the length of time it took to do things. It stressed friendships in that 'pushing' people to do things had a negative effect on working and personal relationships.
- Could not devote more time to recruitment efforts for the Department.

### Unexpected outcomes attributed to WebCLS

The respondents reported the following unexpected positive and negative outcomes that they attributed to their participation in the WebCLS project.

- Although the WebCLS project was not considered 'scholarly activity' by the APT committee, it was considered as a 'teaching activity' and has resulted in my promotion.
- I believe that the friendships which developed because of the grant, will serve as a springboard for future projects.
- Positive networking with instructional technology experts, working with graphic designers, and learning new technology.
- I would have to say the collaboration with other professionals in the area of distance education, graphic artists, and programmers, was a positive outcome for me. If it was really finished, I would be able to say the finished product is the most positive outcome for me and my MLT graduates. Negative outcomes were my inability to finish something in a timely manner because of constant changes and little time to work on the project at home.

## CONCLUSIONS

Overall, the faculty members were satisfied with their participation in the WebCLS project. One of the most positive outcomes of the WebCLS project, as reported by the survey respondents, was their belief that participation in the project expanded their contacts with colleagues in CLS education, as well as with instructional design experts, computer programmers, and other technical support personnel. Furthermore, this outcome prompted several participating faculty members to report that this enhanced collegial relationship will sustain their interest in curriculum development over time.

While the primary objective of the WebCLS project was developing Web-based, instructional materials/courses for distance education, the participating faculty members also reported that they now integrate more technology in their teaching, better organize their courses, develop and use alternative methods of evaluating students, and were moving away from lectures towards more student-centered activities.
Once completed and available, the WebCLS course materials will be widely used by the participating faculty members. Plans include reinforcing and enriching classroom teaching, replacing existing traditional instruction, and offering continuing education programs and refresher courses.

The problems associated with faculty members' participation in the project primarily focused on lack of quality time devoted to developing the CLS instructional units. Heavy teaching loads and lack of release time caused delays and gaps in the time available for project activities of most faculty participants. For future projects, more priority should be given to securing solid commitments from institutional leaders to assure that release time is available for CLS faculty members to work specifically on project activities.

The WebCLS project clearly had positive effects on the participating CLS faculty members, and subsequently, should enhance CLS education. Future projects should build on the expertise of this cadre of CLS educators who are well prepared to move CLS distance education to a more advanced level.

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