

Evaluating Technology-Enhanced Continuing Medical Education

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Abstract - Technology is changing the face of continuing medical education (CME). However, will it improve the quality of CME? No longer is it sufficient to count heads or ask if participants liked the experience. It is time to look at CME's influence on performance, habits, and perhaps even outcomes, and to use data to continuously improve CME programs and practices. As CME experiences integrate into professional life in the forms of online knowledge tools streamed to the bed side, mobile advice and e-coaching, all of which pay scant attention to time or place, evaluation methods and questions must evolve to provide meaningful feedback.

Keywords: Evaluation, continuing medical education, CME, technology, online learning, mobile learning.

Technology is beginning to alter the face of continuing medical education (CME). Innovations emerge in the form of accessible expertise, simulations, and online reference libraries, as well as pedagogical strategies, such as e-coaches and even a virtual medical school.¹ Health professionals are increasingly relying on the Internet. In 2001 only 2.7% of physicians reported that they used the Internet for CME² whereas, recent figures show online use of the Internet to be approaching 31 percent, with access to CME as the second most common reported Internet use by physicians. The Accreditation Council for Continuing Medical Education (ACCME) in the United States reports an upward trend in CME offerings, in particular, online CME. From 2003 to 2004 the number of directly sponsored Internet CME activities increased by 121%. This corresponds to a 70% increase in physicians participating in Internet CME activities.³

Although most CME experiences remain scheduled moments in time, such as workshops in hotels or seminars on ships, CME, like professional development in business and government, is starting to happen in new ways. The possibilities commence with familiar approaches that take experts and capture them online, available whenever or wherever the health professional has time for a lesson. Other strategies break old molds and provide learning and reference as sidekicks to the working health professional, through answers to questions, targeted databases, and online community experiences. Consider the options, noted by Abdolrasulnia

et al.⁴ such as emails and tailored feeds to desktops and personal digital assistants (PDAs). Such initiatives are intimations of the shift from formal, scheduled CME activities to "on demand" education and information using laptop and mobile access to the Internet.

These new education programs are happening in parallel with consideration of a link between impact and compensation. In early 2005, the U.S. Centers for Medicare and Medicaid Services announced plans to launch a program that pays some physicians based on performance. Acknowledging the influence of such a move, Skidmore⁵ noted that there are already more than 100 American programs that link quality to payment. Quality initiatives are being piloted throughout the United States, and bonuses are being paid to doctors who follow a strategy of error reduction and improvement in care. These and other pay for performance approaches are examining the factors that influence change in prescribing patterns, care, follow-up treatments, and results.

The movement towards accountability affects the sanctity of both the classroom and the patient-physician relationship. Although concerns about metrics, privacy and access must be mitigated, new technologies, approaches, and intensity propel looking in fresh ways at continuous learning for health professionals based on "best evidence available."⁶

Not surprisingly, this raises questions about the appropriateness of outcomes as a means of evaluating how well the health professional is performing. Some argue⁷ that results oriented health indicators should not be used as a reflection of good practice and that confusion exists between what is being measured and what those figures really mean. Can the practice that regularly checks its diabetic patients be judged as not performing when there is non-compliance by patients? Can the practitioner who has his office in a high-risk asthma area be judged as not performing when asthma levels fail to improve? On the other hand, can the organization that offers CME, or a regulatory body that requires it, eschew claims to influence practice and outcomes?

In the past, most physicians chose CME based on reputation, habit and convenience. Today, with more options, including some that are unfamiliar, there is demand for evidence about what works and under what circumstances.⁶ Increases in CME variety, independence, and self-direction are similarly reported in the American Society for Training and Development's (ASTD) 2004 survey of workforce learning trends.⁸

Approaches to Evaluating Technology Enhanced CME

While there are reasons to anticipate that online CME has the *potential* to improve clinical performance and patient outcomes, there is little data to support that positive assertion.⁹ Early on, Flagg¹⁰ noted that the shift to computer-based education raises questions about the evaluation of such learning activities. These questions can only be answered by considering new ways of looking inside CME.

Technology can narrow, and sometimes remove, the gap between learning and work. Thus the increase in technology-based CME offers opportunities for more expansive and authentic evaluations that are situated within learning, information, and practice. Questions about impact would be asked in juxtaposition with the work, when the physician is making diagnoses, ordering tests, communicating with colleagues and patients, undertaking research, and selecting treatments. Harasim et al.¹¹ encouraged reliance on richer evaluation activities, such as focus groups and interviews, where dialogue becomes an important source of information. The opportunities for improving CME experiences are real. Consider the insights to be derived from on-demand surveys, choices about learning paths, participation in online communities, satisfaction with an e-coach or online module, and judicious consideration of trends in outcomes.

According to the American Society for Training & Development's (ASTD) State of the Industry Report 2003,¹² evaluation is becoming more data-driven through technology-based metrics and measures. *Interested in an individual's progress on communication skills?* That can be tracked in ways that include her perceptions and those of others. *Eager to find out if physician assistants are participating in an online community that extends messages presented during a class?* *Want to know what questions vex them and cause them to refer to the online database?* All this is available. As patient charts acquire radio frequency identification (RFID), the latest research on Kaposi's sarcoma or multiple myeloma, for example, can be delivered to the right bedside at the right time, as the health professional approaches. The system can measure use, while also inquiring about the professional's view of the value of targeted education or information.

Here we use a familiar model of evaluation to present a framework for looking at the new forms of CME. Kirkpatrick^{13,14} provides a recognized approach to evaluation. A recent ASTD survey¹² found that 67% of responding organizations conducted evaluations using Kirkpatrick's 1959 model for traditional and online learning activities. Even though ASTD's sample is composed predominantly of corporate and government workforce learning professionals, the model and message is relevant for continuing medical education. As is the case in CME, ASTD reports steady, inexorable advances in technology-based learning, with as much as 34% of award-winning organizations' workforce development now delivered via technology. What does this mean for efforts to gain insights into the value of such programs?

Kirkpatrick's^{13,14} model is based on four levels of evaluation, as seen in Figure 1. Of particular interest is the distinction he drew between assessment activities undertaken *during* training, Levels 1 and 2, and what happens afterwards, in the world of results and practice, Levels 3 and 4.

Is Kirkpatrick's model up to current tasks and technologies? Rossett & Sheldon¹⁵ argue that the problem is not with the model, but with the nature and quality of questions. A world with CME delivered online, at work via PDAs, streaming video, mobile phones, online knowledge bases, classrooms, and workplace coaching demands new inquisitiveness. Figure 2 tailors questions to education and information that takes advantage of emergent technologies. Rather than assuming that evaluation is a satisfaction survey, this expanded approach envisions the ways that technology-enhanced CME happens, and insinuates assessment into these more pervasive experiences. As learning follows the health profes-

Level 4 RESULTS: Has the CME influenced patient care and/or clinical practice?
Example: post-CME surveys that inquire about the effects of the program
Level 3 BEHAVIOR: Has knowledge and/or skills transferred to practice?
Example: post-CME surveys that seek to measure actions and choices at work
Level 2 LEARNING: Have they learned what they were supposed to learn?
Example: multiple choice tests; hands-on practical tests
Level 1 REACTION: Did health professionals like the CME activity?
Example: survey 'smile sheets'

Figure 1 Kirkpatrick's Four Levels Applied to CME

sional into practice, so does assessment. This is beginning to happen in medical education. Jackson et al.¹⁶ described a course that uses wireless mobile devices for many reasons, including more frequent evaluation and enhanced access to data.

The Figure 1 distinction between learning experiences and work practices has a long history in classrooms with intact classes. That approach made sense when learning was confined to a defined time and place, when an individual was either in class or not in class. The distinction has less meaning today, as technology closes the chasm between learning and work and integrates reference, coaching, and learning into practice.

Evaluation, like learning, can then occur at any time. *Did you like the course? Did you learn?* Questions like those often conclude a traditional CME experience. They remain valuable, but are not sufficient. As a result of a growing assumption that health professionals will stay involved with the learning material after experiences conclude, and even continue to participate online with peers and experts, the tense used in much evaluation activity should change from the past to present. Now questions are about understanding the system and options, staying engaged, looking to best evidence to bolster decisions, and, as is emphasized by Phillips,¹⁷

considering the return on investment for self, institution, and patients. Appropriate questions now include: *Are you using online resources? Do you participate in an online community? Have you taken advantage of your e-coach? Do you think you are growing more adept? Are you receiving good value for your time and money?*

Figure 2 touches familiar Kirkpatrick bases about learning and practice and adds questions that inquire about authentic and continuous growth, development and actions. Figure 3 removes levels and the conventional markers of learning in a set time and place. The levels disappear because learning and assessment are ongoing and merged with practice. The circle appears because it depicts evaluation questions integrated into a professional life that includes learning, knowledge assets, and community. This more integrated evaluation asks questions about satisfaction, engagement, influence, and value. It also asks them frequently, over time and in space. Learning as a lifelong process is recognized, honored, supported, *and* evaluated.

Evaluation in Practice

How would real time evaluation work? Consider how learning and evaluation might be integrated into the working lives of 5 physicians.

Level 5 VALUE: Are benefits commensurate with cost and effort?
<p>Do health professionals believe they received useful, high value skills, knowledge and perspectives? Do they think they have made a good investment?</p> <p>Do patients receive benefits? Do they perceive these benefits?</p> <p>Do supervisors see more skill, fluency, speed?</p> <p>Does knowing and doing result in rewards and recognition for the health professional?</p> <p>Does it relate to careers? New lines of business?</p>
Examples: Practice audits: staff, budgets, and patient care indicators
Level 3 & 4 PRACTICE: Are they practicing more effectively, providing better services to patients?
<p>What has changed in daily practice?</p> <p>How are health professionals responding to new knowledge, skills, and reference materials?</p> <p>Do they reach for technology-based assets or e-coaches when needs emerge?</p> <p>Do health professionals perceive improvements?</p> <p>Do managers and patients report improvements?</p> <p>Are new practices being shared with colleagues?</p>
Examples: supervisory checklists; confidence logs; portfolio assessments; practice audits; peer reviews; open interviews; surveys of patients, supervisors, practitioners; participant observations
Level 2 LEARNING/REFERENCE: Are they learning and can they find what they need to be more effective?
<p>Do they know why this is important? Can they do it? Explain it?</p> <p>Do they know when to use what they have learned? When not to?</p> <p>Do they know where to go to search and find what they need?</p> <p>Have they increased fluency and confidence?</p> <p>Are they using knowledge bases and participating in online communities?</p>
Examples: measures of use; authentic assessments, such as cases, problems, and feedback; video scenarios; analysis of cases and recommendations for improvement; pre and post knowledge/skill testing
Level 1 REACTION: Do the health professionals like the CME event?
<p>Is the system understandable? Is the interface appropriate? Do they know where to go to find what they need or want? Do they receive technical support when they need it? What about flexibility of choices? Are they sticking with the program? Do they return repeatedly to assets? Do they recommend the program to others? Are they satisfied with what they receive?</p> <p>Would they recommend the experience and system to others?</p>
Examples: post-CME feedback via online surveys; interviews; focus groups; email queries; virtual 'suggestion box'

Figure 2. Five-level Evaluation for Technology-Enhanced CME

Case 1. Dr. Rogers is a family physician with a special interest in diabetes management. Surfing the Internet to find information takes time, which Dr. Rogers does not have. He is also concerned about the quality of information that he encounters. In addition, his Internet connection does not allow for large bandwidth downloads. Instead, Dr. Rogers stays up to date on diabetes by receiving targeted email feeds, visiting a trusted web site devoted to diabetes care, and participating in a dedicated online community that examines research, cases and discusses exemplary approaches. Dr. Rogers continues to take short courses from experts at conferences and meetings.

Dr. Rogers is questioned after his use of these re-

sources. *Was the material useful? Is it timely? Are there lingering questions or concerns?* Credit for CME activity at conferences and meetings is linked to completion of post-activity surveys and participation with community members on the cases. CME providers improve and target their programs based on what Dr. Rogers and his colleagues tell them.

The effectiveness of the hybrid programming is judged, in part, by the quantity and quality of participation by Dr. Rogers and his peers. It could even extend to questions about Dr. Rogers' efforts on behalf of his patients and to their health outcomes. With the doctor's agreement and perhaps some curiosity about value de-



Figure 3 Learning and evaluation integrated into the life of the professional

rived from his CME investments, a practice audit might examine his adoption of best practices for diabetes care and health indicators.

Case 2. Dr. Volker works in a rural correction facility and treats many HIV patients. Her access to mainstream hospital facilities and other colleagues is limited and family responsibilities reduce time to attend face-to-face CME programs. She accesses CME online, where she engages with tutorials, streaming video presentations by experts, and cases that have been prepared by experts. These problem-based cases are interactive with feedback on her diagnosis and treatment compared to experts' efforts. Assessment links to a related certificate program that grows and changes based on participants' feedback about their experiences and changes in HIV care.

Multiple-choice items retain a place in CME evaluation, especially when the items are grounded in daily challenges. Such items are useful methods to determine if Dr. Volker has gained knowledge, for example, regarding new treatments or prescription changes. *Is Dr. Volker using the latest research and approaches? Can she recognize treatment plans that would be ill-advised? Does she know why? Are patients getting contemporary treatments matched to their needs and circumstances?* Figures 2 and 3 present new possibilities for inquiry.

Case 3. Dr. Raj Patel works in a city hospital in the Oncology Department. Although he works long hours, learning remains a priority for him, especially when the topic is cancer care. A patient's family member asks Dr. Patel about a possible change in chemotherapy, an idea he picked up on the Internet. Dr. Patel logs into the evidence-based database on his handheld device and checks for current information. He also schedules time with an e-coach at a distant teaching hospital. A researcher on cancer care, the e-coach reviews records, answers questions, points Dr. Patel to a recently published article, and asks him about the success of an approach she'd suggested during their prior conversation.

CME providers should be concerned about confirmation of the impact they have on practice and care. *Does Dr. Patel feel more confident about his choices and the underpinnings for those choices? Did the family feel informed? Did the patient respond well to the new chemotherapy regimen? Does the e-coach help Dr. Patel learn and solve problems?* More insight might be gained as the system urges Dr. Patel to consider patient outcomes in order to compare treatments and results since participation in the program.

Case 4. Dr. Marta Alvarez is an inner city inter-

nist. She is concerned with providing great care while running what has turned out to be a complicated small business. Dr. Alvarez turns to her professional association in search of online education about small business management. She selects an accounting course and then surprises herself by liking the technology-based learning modules and participating in the online community and assessments. When asked to reflect on the influence the course has had on her, and pondering a checklist provided by the vendor that produced the course, she notes that she now knows where the practice is spending money, compares her cash flow to other similar enterprises, and appreciates being more ready for taxes and audits. Upon reflection, Dr. Alvarez was more than satisfied with her experience. The CME provider, public assessment agencies and Dr. Alvarez are smarter about what she experienced, how she perceived that experience, her ongoing involvement, and implications for the way she conducts her business.

Rogers, Volker, Patel, Alvarez and colleagues across the world could be having these experiences today. Mostly they are not. Not yet. New forms come slowly to education, although certainly they are advancing.^{2,3} The same is true for more pervasive and multi-dimensional evaluations. Slowed by complacency and habits, new methods tangle with the natural reticence within health organizations to external scrutiny.¹⁸ Metrics that indicate a job well done¹⁹ are not yet fully coordinated with educational assets and experiences.

Questions about Evaluation Questions

These perspectives raise questions for further study.

- Will physicians take advantage of opportunities to learn and refer continuously? Simply because something is possible does not mean that it will become widespread. What forces will bring more accessible and targeted learning and support to doctors? What approaches will be most influential? What assets and programs would be most compelling? What role will medical schools play in creating habits of use?
- Are physicians ready for constant and pervasive measurements? Good things might come from examination of online communities, selection of one module over another, review of patient feedback and records, and ratings of an e-coach. However, will such inquisitiveness be accepted? Will physicians be eager to learn about their own learning? Will the benefits of tracking be recognized? Will those benefits be delivered? Will privacy be protected?
- The actions and choices of participating physicians are essential to the forms of evaluation discussed

here. What do the physicians do with their time? Do they refer to the provided materials? How do they answer questions? Do they persist in their engagement with these programs? Do they welcome new and sometimes far-flung experts into their lives? These behavioral indicators, registered over time and in context, are generally judged to provide more robust insights into the worth of the CME than a self-report survey. Are they worthy of this appreciation? How can they be strengthened? How can concerns about tracking and privacy be mitigated?

- As providers and accreditation bodies partner to establish both openness¹⁸ and data protection, it is possible to imagine an environment that is rich with answers. Will this happen? Can security concerns and fears of litigation be tempered by partnerships and protections in service to better CME?
- Traditional forms of CME have been evaluated with the traditional survey method, which typically asks for a self-report of satisfaction with the learning activity. The approaches in Figures 2 and 3 extend to multiple sources and outcomes. *Do executives see benefits? Are patients more satisfied? Have patient outcomes improved?* While providing a more rounded picture, questions must be raised about the other factors that could delight an executive or patient. Causation is a major leap. Was it the CME program, the new accounting software, new medication, new staffing, or a new check-in procedure that made the difference?

Conclusion

In a competitive and litigious world, with new forms of education, information, and community, examining the number of hours spent in study, online or in rooms, is insufficient. It is not good enough to serve up a CME feast, even one that is rich with technology-based assets, without gathering data, rendering judgments, and continuously improving. *Were those the right assets? Did they meet needs? Did they learn? Were learning and reference habits established? Is the program influencing even hard-to-measure actions? Are we attentive to issues of access and privacy?*

In the past, a program delivered by an expert from a known institution satisfied. Today there are more possibilities for programming that is experienced in different ways and places. The franchise once held by universities is coveted by others. Medical professionals want to know why *this* program, especially when they can reach around the world for their professional development. More questions, more answers, more sources, and more thoughtfulness are demanded.

As calls go forth for better education, better professional practices, and better evidence,²⁰⁻²² will CME be inspired by the possibilities that emerge from the nexus of education, technology and assessment? There are good reasons for CME to turn to enhanced evaluation in order to develop both itself and the profession.

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