

# The Growth, Characteristics, and Future of Online CME

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**Introduction:** Physician use of online continuing medical education (CME) is growing, but there are conflicting data on the uptake of online CME and few details on this market.

**Methods:** Analyses of 11 years of data from the Accreditation Council for Continuing Medical Education (ACCME) and a survey of 272 publicly available CME Web sites.

**Results:** The data suggest that online CME was 6.9%–8.8% of CME consumed in 2008. If previous exponential growth continues, online CME is likely to be 50% of all CME consumed within 7–10 years. Most (60%) online CME is produced by medical publishing and education companies. The online CME marketplace is consolidating, with 16% of surveyed sites providing 76% of available credits. Currently, 70% of online CME is offered at \$10 or less per credit. Most online CME uses low-technology educational approaches, such as pure text and repurposed live lectures.

**Discussion:** Online CME use is growing rapidly and is likely to be half of all CME consumed by practicing physicians within a few years. The pattern is consistent with Christensen's model of "disruptive innovation," whereby an innovative technology eventually displaces an incumbent technology by first providing a relatively low-quality, low-cost product that meets the needs of unserved customers. The technologies being developed for online CME may facilitate broader changes in medical education as well.

**Key Words:** Internet CME, online continuing education, medical education, disruptive innovation

## Introduction

Internet-delivered, computer-based continuing medical education (online CME) is an educational innovation that offers potential advantages to busy physicians, including lower cost, easier use, and comparable or even superior educational effectiveness.<sup>1</sup> Unfortunately, data on the growth and use of online CME are limited and, at times, conflicting. Physician surveys show that most physicians still prefer CME delivered by traditional sources.<sup>2–4</sup> Such data suggest that online CME is in an early phase of adoption and growing slowly. In contrast, commonly cited data from the Accreditation Council

for Continuing Medical Education (ACCME) give the impression that online CME is growing rapidly and appears to be in the early majority stage of adoption, where future growth is inevitable.<sup>5</sup> As an example, online CME provided by ACCME-accredited providers accounted for 30% of all CME activities and 41% of all physician CME participants in 2008.<sup>6</sup>

Before projecting trends in the use of online CME, speculating on the meaning of these trends, and recommending strategies to respond to them, it would be helpful to have a better measure of online CME's growth, ideally one that could reconcile ACCME data with physician survey findings. It would also be useful to have more complete data on the overall online CME marketplace. Such data could help better define the kinds of organizations that are active in this new market, whether traditional sources of medical education are engaged or left out, and the evolving business and revenue models for online CME.

## Methods

### *Public CME Data Sources and Their Limitations*

Publicly available data from the 1998–2008 ACCME Annual Reports were used to describe the existing CME marketplace and to project trends in online CME growth.<sup>7</sup> It

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was necessary to devise analytic techniques to adjust for certain limitations in these data.

One limitation of ACCME data is that they do not present the complete CME picture. The ACCME is the only organization that can accredit other organizations or recognize state medical societies to designate and award American Medical Association (AMA) PRA Category 1 Credits<sup>TM</sup>; however, CME credit provided by certain non-ACCME associated organizations is often considered equivalent to AMA category 1 credit for regulatory purposes. Examples are American Academy of Family Physicians (AAFP) prescribed credit and American Osteopathic Association (AOA) category 1-A credit. Additionally, other categories of CME credit (eg, AMA PRA Category 2 Credits<sup>TM</sup>) can be used to meet certain CME requirements. There are no literature reports or public summary data on these non-AMA Category 1 CME activities. Thus, the most reasonable use of ACCME data is as a *sample* of the U.S. CME enterprise, not a description of the entire enterprise.

A second limitation of ACCME data is that the public information supplied by the ACCME does not describe actual CME use. ACCME-accredited providers report the number of CME activities produced, maximum number of hours (credits) offered for each activity, and participants per activity for various delivery formats. The resulting aggregate data on activities produced or physician participants have been presented as surrogate measures for use, but these data do not reflect the number of Category 1 CME credits actually claimed by, or even *offered* to physicians who have used a specific CME delivery format.

#### *Online CME Web Site Survey*

Between June 2008 and May 2009 the authors completed a census of all 272 online CME Web sites that are described on a comprehensive, publicly accessible list of online CME Web sites.<sup>8</sup> This CME list has previously been accepted by others as complete and characterizing the entire online public CME enterprise.<sup>9,10</sup> The online CME list contains all unique CME Web sites that can be located with online search engines. It also includes sites added via personal recommendations. The CME list's search and listing methodologies are more completely described elsewhere.<sup>11</sup>

The CME list excludes CME Web sites that are portals or gateways to other sites, sites that provide only live Web casts, and sites associated with Internet searching and learning (Internet point of care). Additionally, it does not include some publicly accessible CME Web sites that have restricted access, such as professional organization members-only CME sites. Nor does it include non-public-access online CME, such as internal CME offered by Kaiser Permanente. We did not attempt to describe or locate the sites that were not contained on this list; thus we cannot further characterize the universe of online CME Web sites.

Survey data collected from sites contained on the list included the name of each online CME site, the site's Web

address, the total number of CME credits offered for all activities, whether the site charged for CME credit and how much, whether the site's CME programs were entirely supported by grants from industry, other sources, or user fees, the type of educational format(s) used, and the medical specialties covered. Educational formats were broadly categorized as using a single format, such as text or streaming video, or a combination of formats.

Most of the CME Web site data were collected by a single individual (BMS). Two other authors (RWA, CN-M) audited a random 10% of the entries and updated information on 50 additional sites. The audit process confirmed consistent information in 90+% of the sites reviewed. For smaller sites, survey data were based on information listed at the site or collected following review of the online courses offered. For larger sites (50+ online programs), census data were based on information supplied by the site's owner(s).

#### *Analytic Techniques*

ACCME data were used to calculate a "Potential CME Consumption Index" for each type of CME activity. The values for this index were derived from the total number of physician participants per format multiplied by the total available hours (credits) of instruction per format divided by the total number of activities per format per year. Intuitively, this index represents the total amount of CME hours (credit) offered to all physicians who participated in an average length activity using a particular delivery format. This calculation is based on the statistical principle that the expected value of an activity length (ie, credit offered per activity) approaches the average value of an activity length in large data sets.

The calculated index of potential CME consumption (based on hours/credits offered) per delivery format was used to estimate the "share" for each format. Although there are no data on the actual amount of CME hours/credits consumed (or claimed) by physicians in a year, the underlying assumption was that the amount of CME hours/credits actually consumed (claimed) by physicians using a particular format was closely correlated with the amount of CME hours/credits offered for each format, and that this correlation was independent of CME format. In other words, that there was no systematic bias in the relationship between CME offered and CME claimed based on delivery format. If these assumptions are valid, then relative relationships, such as share, will be similar for the amounts of CME offered and CME consumed.

Data on Internet enduring materials offered by ACCME accredited providers between 1998 and 2008 were used to plot changes in estimated online CME market share ratios over time. These data were plotted using semi-logarithmic scaling based on the method described by Christensen.<sup>12</sup> The data points represent the ratio of estimated market share of online CME, defined as Internet enduring materials only, to the estimated market share of all other CME formats. Semi-logarithmic scaling reduces the typical S-shaped adoption

The Growth of Online CME

TABLE 1. 2008 Market Share Estimates for CME Activity Type Based on ACCME Aggregate Data and Calculated Index of Potential Physician CME Credits Consumed (Earned) per CME Delivery Category

Type of CME Activity	Number of Activities Offered [A]	Total Hours (Credits) Provided [B]	Total Physician Participants [C]	CME Potential Consumption Index [B * C/A]	Market Share Based on Index
ACCME-accredited CME providers only (N = 725)					
Live courses	40 342	326 306	1 617 566	13 083 672	14.3%
Live series (conferences)	11 407	285 641	2 458 807	61 570 622	67.3%
Internet (live)	1 511	3 774	49 802	124 390	0.1%
Test item writing	53	684	1 521	19 630	0.0%
Committee learning	167	679	1 914	7 782	0.0%
Performance improvement	895	2 266	8 112	20 538	0.0%
Internet searching and learning	517	346	127 571	85 376	0.1%
Manuscript review	3 835	43 722	31 431	358 338	0.4%
Learning from teaching	2 207	8 154	5 305	19 600	0.0%
Internet enduring materials	28 723	53 824	4 187 641	7 847 216	8.6%
Other enduring materials	7 714	35 849	1 394 280	6 479 588	7.1%
Journal CME	3 527	8 193	781 564	1 815 524	2.0%
<b>Total*</b>	<b>100 898</b>	<b>769 439</b>	<b>10 665 514</b>	<b>91 432 277</b>	<b>100.0%</b>
ACCME-accredited CME providers plus state medical society accredited providers (N = 2,325)					
Live courses	71 555	445 871	2 231 582	13 905 355	11.7%
Live series (conferences)	22 973	470 703	4 291 594	87 932 189	74.0%
Internet (live)	2 118	5 446	58 757	151 082	0.1%
Test item writing	64	796	1 550	19 278	0.0%
Committee learning	748	2 566	13 079	44 867	0.0%
Performance improvement	309	4 187	13 370	181 166	0.2%
Internet searching and learning	1 221	838	133 408	91 561	0.1%
Manuscript review	3 840	43 736	31 439	358 077	0.3%
Learning from teaching	3 218	11 009	8 774	30 016	0.0%
Internet enduring materials	30 536	57 971	4 219 868	8 011 199	6.7%
Other enduring materials	8 847	38 910	1 422 574	6 256 624	5.3%
Journal CME	3 973	9 259	788 619	1 837 861	1.5%
<b>Total*</b>	<b>149 402</b>	<b>1 091 292</b>	<b>13 214 614</b>	<b>118 819 275</b>	<b>100.0%</b>

\*Sum of preceding rows. N = total number of CME providers.

Source: <http://www.accme.org>.

curve to a straight line, allowing visual assessment of how well market data fit the theoretical adoption curve. It also allows a graphical projection of trends using a regression line.

As noted, ACCME data were used to present relative, not absolute relationships. Primary analyses were based on data reported by ACCME accredited CME providers only, assuming that these data reasonably represented the entire CME marketplace. In 2003 the ACCME began reporting data on AMA category 1 programs from providers accredited by state medical societies. Where feasible, data including information from state medical society accredited CME sponsors were also analyzed.

Web site survey data were tabulated with the use of the site as the unit of analysis. Sites presenting pure examples of a single feature, such as those supported entirely by grants from commercial organizations, or those using only a single educational format, were distinguished from sites that exhibited more than 1 example of a feature.

## Results

### Current Online CME Market

The most recent 2008 ACCME aggregate data and estimated market shares for various delivery formats, as well as

examples of the underlying calculations, are shown in TABLE 1. The estimated market share of online CME, based on the ratio of potential CME consumed for online CME divided by all potential CME consumed in 2008, was considerably lower than the impression given by oft-cited data. The estimated market share for online CME in 2008, including all forms of Internet-based CME, was about 8.8% of all CME potentially/actually consumed, versus, for example, 41% of all physician participants. When additional data from state medical society accredited providers were considered (also TABLE 1), the online CME market share in 2008 declined to 6.9% of the total. In contrast, the market share for live events (courses and conferences) was 82% for ACCME-accredited providers and 86% based on the larger group of providers. The picture that emerges from these data is that many physicians were using online CME in 2008, but the vast bulk of the CME consumed was presumably live, not online, CME.

TABLE 2 presents the relative share of the 2008 online CME market that was accounted for by different types of organizations. These data show that the market for Internet enduring materials, the dominant form of online CME, was led by commercial education and publishing companies, with a 61.3% share. The market for the newest and fastest-growing form of Internet CME, Internet searching and learning, was virtually owned by these organizations, with a 98.6% share. These conclusions are not altered by including data from the 1600 state medical society accredited providers, because these organizations only provided 2% of all online CME in 2008. Analysis of the data based on type of CME produced by each organization type and data from ACCME-accredited providers shows that 56% of the CME produced by education and publishing companies in 2008 was online CME, whereas 0.9% of the CME produced by medical schools and 9.1% of the CME produced by professional societies was online CME (data not shown).

*Market Share Trends*

FIGURE 1 shows trends in online CME market share growth, with the use of the ratio of estimated online to non-online CME market shares, over 11 years, plotted semilogarithmically. This figure includes a trend line based on these data, extended for 10 years. As can be seen, the existing data fit the trend line well ( $R^2 = 0.91$ ) and, if current growth continues, the ratio of market shares will be 1 and online CME will be 50% of all CME provided/consumed in 2016. In sensitivity analyses, when the data from state medical society accredited sponsors were included and the calculation was truncated in 2003, the projected 50% market share for online CME will be reached in 2019 ( $R^2 = 0.83$ , data not shown).

*CME Web Site Survey Results*

TABLE 3 outlines the key characteristics of the 272 publicly available online CME sites reviewed during June

TABLE 2. 2008 Market-Share Estimates for CME Activity Type Based on Organization Type—ACCME-Accredited CME Providers

Organization Type	Government or Military	Hospital/Health Care Delivery System	Insurance Company/Managed Care Company	Nonprofit (Other)	Nonprofit (Physician Membership Organization)	Not Classified	Publishing/Education Company	School of Medicine	Total share
Number of providers	14	90	15	38	267	32	144	125	100%
Internet live	0.5%	8.0%	0.1%	1.5%	40.6%	11.7%	29.8%	7.7%	100%
Internet searching and learning	0%	0.1%	0%	0%	1.1%	0%	98.6%	0.2%	100%
Internet enduring materials	0.5%	2.5%	0.2%	4.3%	20.5%	2.5%	61.3%	8.3%	100%

Source: <http://www.accme.org>.

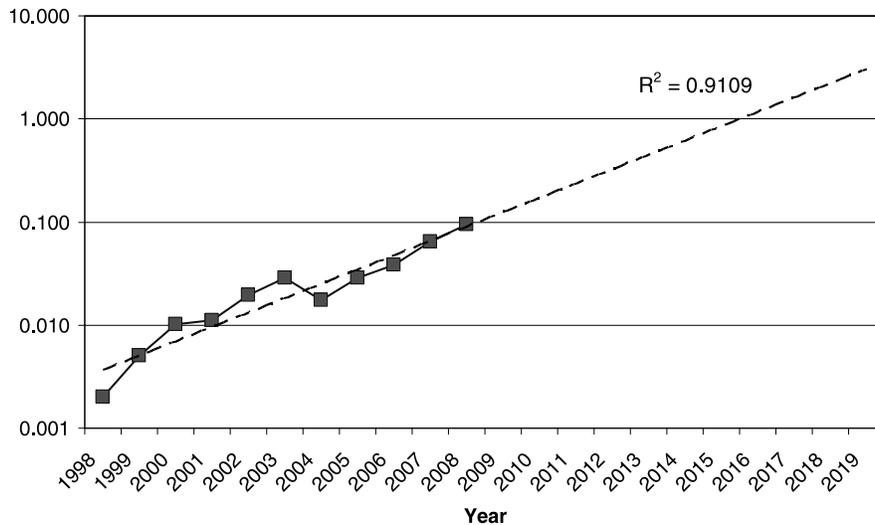


FIGURE 1. Relative market share of online (enduring) CME 1998–2008. Figure shows market share of online (enduring) CME relative to market share of all other CME formats. Data are from ACCME-accredited providers. Trend line is based on exponential function.

2008–May 2009. These sites accounted for 20 613 CME hours/credits. Almost all, 98% or more, of this credit was AMA PRA Category 1 Credit™. Based on ACCME data showing that accredited providers offered 51 804 online CME hours/credits in 2007 and 53 824 online CME hours/credits in 2008, the survey accounted for about 38% of the online CME hours/credits offered during the survey period.

The pattern that emerges from these data is one of consolidation, low price, and competing business models. During the survey period, most (76%) publicly available online CME was offered by a small fraction, 45/272 (16%) of online sites. In fact, 41% of the publicly available online CME was offered by only 8 (3%) of the Web sites. About 34% of online CME was available for free and another 36% cost \$10 or less per credit. Most sites that offered free online CME, 102/172, were entirely supported by grants from commercial companies. Although direct advertising is not permissible on CME sites, these sites could be considered examples of an advertising business model wherein 1 entity pays for a service that benefits another entity for commercial purposes. Some free sites, 61/172, did not have evidence of any commercial support, and these sites could be considered examples of an organizational or philanthropic model where the cost of the CME was underwritten by an organization with a noncommercial interest in the service. Finally, there were a small number of sites, 24/272, that appeared to be entirely supported by user fees, a subscriber-based or pay-for-play business model, where the end user pays directly for the service. These pure pay-for-play sites offered a surprisingly large number of credits, 37% of the total.

In terms of teaching format or method, a substantial number of sites, 106/272, used a single noninteractive, didactic approach such as text, slides, or repurposed live presenta-

tions. Almost half of the sites (48%) used more than 1 approach. This was typically a combination of noninteractive approaches. A very small number of sites, 25/272, representing an even smaller percentage of credits, 4%, used case- or disease-based interactive formats exclusively.

Virtually all medical specialties had online CME available to them, but very few online CME sites were devoted to a single specialty. As can be seen from the table, most sites surveyed, 69%, which offered 86% of the available CME credits, covered 2 or more specialties.

## Discussion

There are limitations to these analyses. First, they are based on an unproved assumption that ACCME data encompass the bulk of the relevant CME market and reasonably represent the entirety of this market. Second, key conclusions are based on a calculated, surrogate measure of CME market share rather than a more accurate measure that reflects CME actually consumed. Third, the CME Web site survey was subject to sampling incompleteness and, because it took place over a year, to temporal variability. Finally, it would have been helpful to include CME Web site information at the activity level, based on the various categories, such as educational format, medical specialty, or source of support, but this would have required a review of each online CME activity, which was not feasible.

Despite these shortcomings, these data provide useful insights on the growth of online CME. The ACCME data do show persistent and stable long-term trends and the calculated market-share indices seem to explain the observation that many physicians are using online CME, but that it does not yet dominate the CME marketplace. This technology is most likely still in the early phase of adoption, with less than

TABLE 3. Characteristics of 272 Online CME Web Sites. Survey Period: June 2008–May 2009

Characteristic	No. of Sites	Percent of Sites	No. of CME Credits*	Percent of Credits
All sites	272	100.0%	20 613.25	100.0%
Sites offering >100 credits	45	16.5%	15 639.25	75.9%
Average charge/credit				
Free	172	63.2%	6 992	33.9%
\$1–\$10	39	14.3%	7 371.5	35.8%
\$11–\$25	50	18.4%	6 034.25	29.3%
>\$25	7	2.6%	142.5	0.7%
Unknown	4	1.5%	73	0.4%
Financial support				
Commercial support only (free)	102	37.5%	3 639.5	17.7%
Commercial support only (not free)	16	5.9%	992.25	4.8%
Commercial support only (fee unknown)	3	1.1%	52	0.3%
User fees support only (not free)	24	8.8%	7 608.5	36.9%
User fee + some commercial support (not free)	9	3.3%	511	2.5%
User fee + some commercial support (free)	9	3.3%	1 246.5	6.0%
User fee + some commercial support (fee unknown)	1	0.4%	21	0.1%
Other support† (not free)	47	17.3%	4 436.5	21.5%
Other support† (free)	61	22.4%	2 106	10.2%
Teaching format				
Text only	27	9.9%	2 584.75	12.5%
Text and graphics	22	8.1%	601	2.9%
Text and audio	3	1.1%	6.5	0.0%
Slide audio lecture	21	7.7%	677.5	3.3%
Slide video lecture	26	9.6%	3 491.5	16.9%
Streaming video	2	0.7%	130	0.6%
Question and answer	3	1.1%	204	1.0%
Case- or disease-based interactive	25	9.2%	920.25	4.5%
Game	8	2.9%	94	0.5%
Slide only	2	0.7%	25	0.1%
Slide and text	3	1.1%	72	0.3%
Combination	130	47.8%	11 806.75	57.3%
Specialty				
Family medicine	9	3.3%	234.75	1.1%
Internal medicine	2	0.7%	127	0.6%
Pediatrics	7	2.6%	279.5	1.4%
Single specialty	67	24.6%	2 341.25	11.4%
Two–five specialties	166	61.0%	12 101.5	58.7%
Multiple specialties (>6)	21	7.7%	5 529.25	26.8%

\*Most (98+%) credits were AMA PRA Category 1 Credits™. Remainder were AAFP-prescribed credit.

†Other support includes medical school, professional society, other nonprofit, and government.

10% market share. Apparently contradictory statements, such as optimistic projections about the growth of online CME by the President of WebMD<sup>13</sup> and pharmaceutical industry satisfaction that the growth of online CME has not affected meeting and trade show attendance,<sup>14</sup> are both grounded in reality.

The CME Web site survey is the largest and most comprehensive review of online CME to date. It confirms that, at least for publicly available CME, most online CME is consolidated in a small number of Web sites and is provided for free or at a very low price.

Because of the exponential growth of online CME, the next 10 years in the CME industry could be considerably different from the previous 50. In 7 years or sooner, the Internet could deliver half of all CME consumed by physicians. Moreover, this calculation does not even consider the present rapid growth of Internet searching and learning. The growth of online CME is not being led by the mainstream medical education establishment, but by commercial companies. Continuation of such trends will almost certainly disrupt existing CME development and distribution relationships.<sup>15</sup>

Trends in online CME portend broader changes in how medical education is developed and distributed. Christensen's industrial studies of "disruptive innovation" suggest that fundamental changes, ones that markedly lower costs and improve quality, begin when a new lower-quality technology meets the needs of unserved customers, for example, online CME meeting the educational needs of busy or rural physicians who cannot easily attend meetings and conferences. Over time, as the customer base grows and the new technology is improved, organizations that develop the new technology proceed "upmarket," disrupting and supplanting established industry leaders.<sup>16</sup>

Broader use of the technologies being developed for online CME could reduce the need for classrooms and textbooks and facilitate the internationalization of medical education.<sup>17,18</sup> In 2009 Medscape announced upgrades to its CME platform to allow greater personalization of content and easier use of rich multimedia. It also announced that it will offer Spanish and Portuguese language programs to European and Latin American physicians.<sup>19</sup> Thus, organizations that are now developing online CME, such as for-profit education and publishing companies, could soon play a larger role in undergraduate and graduate medical education.

The dominant business model in online CME currently depends on outside commercial support, not user or student payments for revenues. This business model does not compete with the business model used by mainstream medical education suppliers, such as textbook companies. These organizations sell their services directly to end users, such as medical schools, training programs, students, and faculty. However, the mainstream medical education market is vastly larger than the CME market. As Internet-delivered, computer-based medical education continues to evolve, the interesting trend to watch will be whether the traditional suppliers in the non-CME medical education market will adopt these new technologies or whether the companies that develop them to dominate the online CME market will adjust their business models and begin to compete within the mainstream market.

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### Lessons for Practice

- Conflicting public data on the growth of online CME can be reconciled, using a calculation that adjusts for number of activities, number of physician participants, and length of an average CME activity for each type of CME format.
- Based on this calculation, online CME is less than 10% of the CME that U.S. physicians consume annually, but the growth rate is exponential.
- Within 7 years online CME is likely to comprise 50% of all CME consumed in the United States.
- The online CME market is being developed by commercial education companies.
- Trends in the development of online CME are consistent with patterns of "disruptive innovation" described in other industries.

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