Small Footprint, Big Impact:
Supercharging the Workforce with Interactive Online Education

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ABSTRACT

How often does a single training event captivate 1,500 building professionals around the world? We're using a powerful combination of video, PowerPoint, interactive polls, and Q&A to expand our reach and connect our audience to rigorous accredited continuing education programs. Our approach breaks through traditional training barriers—cost, time, and travel constraints—to deliver training worldwide. Online education also benefits energy efficiency program managers by increasing customer participation in and satisfaction with ratepayer-funded programs.

This paper presents a case study of an online course that teaches integrated daylighting design for whole building energy savings. With this program we reached viewers in 48 states and 11 other countries at a fraction of the cost and environmental impact of a traditional event. We discuss the production of both live and on-demand online courses that integrate industry expertise with effective teaching methods. We highlight best practices and lessons learned in sharing information online. Building and retaining a satisfied customer base is crucial to our success and our robust evaluation process keeps us in tune with our customers' needs. Empowering building professionals with the knowledge they need to reduce our energy impact is the challenge. We are embracing this challenge by delivering high quality, convenient and affordable online education programs.

Introduction

Utility energy efficiency program managers have many goals, but increasing customer participation in their ratepayer-funded programs certainly ranks at the top of the list. Incentives and education are two tools that can help motivate program participation, but education goes one step further to help transform the market.

Many utilities provide education programs and typically offer them as traditional live classroom trainings. In addition, with support from member utilities in 2008, the Energy Center of Wisconsin began offering online training in response to growing demand for accessible, affordable, self-paced continuing education tailored to the building design and construction industry. Energy Center University, the Energy Center's education arm, became the gateway to a growing catalog of online courses for commercial and residential building professionals (architects, builders/remodelers, designers, energy managers, engineers, planners/developers, building managers/owners, and weatherization professionals).

Adding distance learning to the Energy Center's live training series was critical to increasing customer participation for the utilities, with customer travel and training budgets slashed. Many utilities have large physical service territories with a number of customers in outlying areas far away from live training venues. Online courses gave these customers easy access to resources, helping to make program benefits and participation viable for all.

The concept of distance learning was not new, but not many education providers were offering online courses in our industry. An early example of a comprehensive online training program is through the New York State Energy Research and Development Authority (NYSERDA). Under a project grant, NYSERDA along with the National Association of State Energy Officials (NASEO) funded by the U.S. Department of Energy Initiative on Cooperative Programs with States for Research, Development, and Demonstration developed the High Performance School Design online training series. NYSERDA's success inspired us to offer online training as part of Energy Center University's overall portfolio.

Evolving Technology

Energy Center staff saw an opportunity to innovate in this area and experimented with several distance learning methods. Our first foray into online education arose from a project in 2007 to deliver a series of live audio webinars to facility managers on college and university campuses throughout the Midwest. This series used a web conferencing tool to combine audio and PowerPoint. Participation in these events exceeded expectations, with more than 100 viewers per webinar.

We also explored another type of online approach, converting our High Performance Glazing course into a self-guided series of webpages populated with text, images, and animated PowerPoint with audio narration. Users completed each section at their own pace and submitted answers to a quiz to receive credit. We found that this particular text-heavy, self-guided approach did not seem to attract many viewers (< 50).

With the advent of new technology offering rich media (the combination of PowerPoint and video streamed together), we recognized the potential impact of delivering courses in this format. Energy Center University had already earned a reputation for providing high quality classroom training. Customers were now demanding online education that mirrored our classroom approach, and rich media allowed us to meet that need by combining technical content delivered by excellent speakers through an accessible, user-friendly interface (Figure 1). We realized that using rich media to display the presenter as well as the presentation was key to fully engaging our online audience.

Figure 1. The Energy Center's Rich Media Approach

Source: Energy Center of Wisconsin 2009

By the end of 2008, Energy Center University had 45 rich media webcasts available for on-demand viewing. They were a combination of recordings from our live classroom trainings, captures of sessions at a variety of energy-related conferences, and Energy Center staff

presentations. We were not seeing as much activity as we had hoped, however. All of these courses were kept behind a registration gateway and 22 of them required payment to view and receive credit. We found that although some customers were viewing some of the free recordings, they were not interested in paying for the accredited courses before they could view them.

Going Live with Rich Media

To grab our customers' attention, we realized we needed to open the gateway and allow them to experience rich media. We also knew the appeal of a live online event, drawing upon our early success in offering live audio webinars. In March 2009, the Energy Center offered its first live rich media program—Daylighting: Lighting Every Building Using the Sky. This event gave Energy Center University an unprecedented number of participants for a single online course, and reached beyond our Midwest borders to connect us with a global audience.

This daylighting webinar offered continuing education credit and was tailored to a commercial building audience. Marketed just one month before the webinar to an email list with 46,546 contacts, 1,305 people registered in advance. The webinar was free to view, but participants needed to pay $49 to take the quiz and receive credit. Because the webinar was scheduled as a live event, we saw our audience respond much more enthusiastically than they had to our on-demand online courses. Even the number of people pre-registering to receive credit for this webinar (56) outnumbered the previous total paid registrations (7) from our entire catalog of on-demand courses. We knew we were on to something big. Was it the topic, the format, the price—or a combination of all three?

The Energy Center's daylighting course had traditionally been offered as classroom training and was often part of a full-day training program or conference. Requiring attendees to commit to travel, lodging, and time away from work restricted our geographic reach. Online courses and classroom trainings can be compared on several levels, but an overall comparison is impossible to make as each approach offers distinct advantages.

Traditional classroom training connects participants to a speaker and to each other in a very direct way and it is hard to replicate this interaction online. Online education, on the other hand, allows us to reach participants who would never be able to attend a classroom training. Both approaches contribute to the success of Energy Center University and to the success of our utility members' programs. Online training supplements our live classroom training with courses to fulfill credit requirements in a very convenient way.

Mark Crisson, President and CEO of American Public Power Association stated that in 2009, 79 of their member utilities participated in a webinar for the first time and this success demonstrates that this approach is meeting an unfulfilled need for smaller utilities (Crisson 2009, 8). Limited budgets and other resource constraints do not eliminate the need for training; the current economic situation only highlights the need for online training.

Achieving Efficiency

Promoting online training as a tool to reduce carbon emissions is relatively new. Not much research has been done to measure the environmental benefits of online training in the U.S. (Priebe 2009). Using the daylighting webinar as an example, one could argue that the amount of electricity to power 648 peak connections (or individual computers) for 90 minutes would create

a larger footprint than a speaker using one computer and projector to present in a classroom. Our daylighting course could never have reached 1,500 people simultaneously in a classroom setting, however, and the emissions saved by participants not having to travel clearly give online training the advantage (Table 1).

Table 1. Cost Comparison: Classroom Delivery Versus Online

	CLASSROOM	**ONLINE**
EVENT	Typical Energy Center Lunchtime Seminar in Madison, WI	Daylighting Webinar in Madison, WI
AVERAGE TIME COMMITMENT PER PARTICIPANT	3.6 hours (1.6 hours average driving time, 2 hours seminar + lunch)	1.5 hours
HOST FEE	$1,250 (venue, food, AV rental)	$2,381 (live streaming for 648 peak connections for 1.5 hours)
PARTICIPANTS	30	1,503 live participants (648 connections + 855 guest viewers sharing those connections)
GEOGRAPHIC REACH	Wisconsin	Global (48 states, 11 other countries)
DELIVERY COST PER LIVE PARTICIPANT	$42	$1.58
ARCHIVED SESSION?	no	yes
ESTIMATED CARBON EMISSIONS FROM ATTENDEE TRAVEL	1.55 tons *	none

* based on an average of 105 round-trip miles driven per attendee

In addition to live webinars, the Energy Center continues to use other methods to capture content for online delivery, including recording courses designed exclusively for on-demand access. This was the initial approach we used with rich media before offering live online events and it is still a cost-effective way to build our catalog.

The most efficient strategy for building our catalog, however, is recording live conference sessions for on-demand access. No additional speaker costs or rich media hosting fees are required. For example, the Energy Center's annual Better Buildings: Better Business Conference provides a large portfolio of conference sessions with content perfectly suited for online access.

A disadvantage of this approach is the occasional disruption it can cause during an event. To minimize the impact of the recording process on a live attendee, the venue must provide ample space for the recording equipment to prevent a blocked view of the speaker. In the near future, we hope to explore the option of streaming a conference event live to a virtual audience, expanding our reach and dramatically reducing production costs while achieving a large return on investment.

Creating a Sense of Place (And Other Distance Learning Challenges)

Although distance learning reaches more people with less environmental impact than traditional training, going virtual has its own set of challenges. Interactivity is extremely important in the learning process and can be difficult to achieve online. Educators in either a classroom or online setting also need to consider the different ways people learn. Howard Gardner's multiple intelligences (Gardner 1983) summarize these learning styles and although some are not as easy to address online as they are in the classroom, rich media tools do create a sense of place for viewers, as if the speaker were presenting directly to them in the same room (Table 2). In addition, the Energy Center's rich media interface gives participants a certain level of control over their online environment, allowing adjustments to screen-size, orientation of the video screen, PowerPoint, and audio levels.

Table 2. Rich Media and Multiple Intelligences

RICH MEDIA CHARACTERISTIC	INTELLIGENCES SERVED
Interface controls	visual-spatial; kinesthetic
Video: speaker's image	visual-spatial; interpersonal
Audio: speaker's voice	verbal-linguistic; musical
PowerPoint images, graphs	visual-spatial
Closed-captioning	verbal-linguistic
Polls for survey and quiz questions	kinesthetic; mathematical-logical; interpersonal
Q&A chat and instant feedback from moderator	interpersonal; kinesthetic
Links to recommended readings and tools	kinesthetic; verbal-linguistic
KEY **verbal-linguistic**: well-developed verbal skills and sensitivity to the sounds, meanings, rhythms of words **mathematical-logical**: ability to think conceptually and abstractly; discerns logical, numerical patterns **musical**: ability to produce and appreciate rhythm, pitch and timber **visual-spatial**: capacity to think in images and pictures, to visualize accurately and abstractly **bodily-kinesthetic**: ability to control one's body movements and to handle objects skillfully **interpersonal**: capacity to detect and respond appropriately to the moods, motivations and desires of others	

Online learning challenges exist not only for viewers, but also for speakers. A speaker presenting an online course should feel as though an audience is present, but that is not always possible. The goal is to eliminate the distraction of the videocamera and other equipment, but to ensure steady video and sound quality. This can often constrain an otherwise animated speaker. Using interactive rich media tools such as polls gives the speaker the opportunity to connect with the virtual audience, and reading questions streaming in via the chat feature assures the speaker that the audience is engaged (Figure 2).

Figure 2. Example of an Online Poll
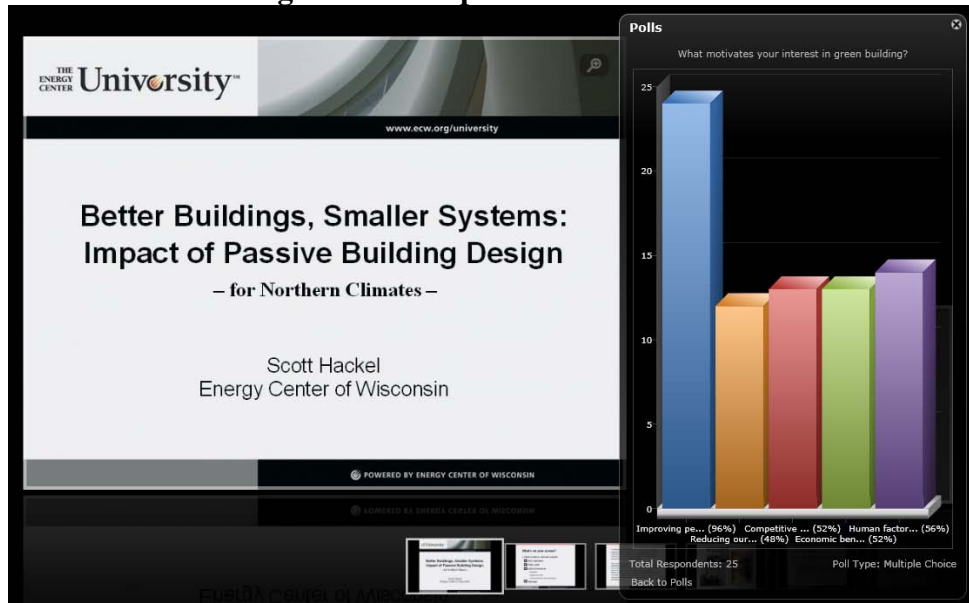
Source: Energy Center of Wisconsin 2009

Poll question: "What motivates your interest in green building?" Responses in descending order of popularity: 1. Improving performance and energy savings, 2. Human factors, 3. Competitive design edge / Economic benefits (tie), 4. Reducing our carbon footprint

Financial Models

Since the daylighting webinar in March 2009, Energy Center University has produced three other live online courses and experimented with two different financial models. We realized that paying to view is not necessarily a disincentive (Table 3). We are seeing differences in response depending on the audience (our commercial viewers seem to register more frequently for online training than our residential viewers, but this may change over time as we add more residential webinars to our catalog).

Table 3. Registration Breakdown for Live Webinars

| WEBINAR / PRESENTER	DATE	AUDIENCE	FINANCIAL MODEL	2009-2010 REGISTRANTS
Daylighting: Light Every Building Using the Sky / Abby Vogen Horn	03/18/09	commercial	free to view; pay for credit	1,324 (77 paid for credit)
Impact of Passive Building Design for Northern Climates / Scott Hackel	10/14/09	commercial	free to view; pay for credit	538 (10 paid for credit)
Building Rating Systems: A Comparative Analysis / Tom Meyer	11/18/09	commercial	pay to view and receive credit	176
Whole House Contracting: Business Development / Keith Williams	02/10/10	residential	pay to view and receive credit	42

Results

In addition to exploring different financial models for registration, we tested the effect of opening up certain on-demand webcasts for free viewing. In the summer of 2009 we eliminated the paid registration gateway to view one commercial and one residential webcast. Although the number of viewers registering for credit (10) was not as high as we had hoped, the number of free registrations skyrocketed (326). Opening up webcasts for free viewing gives us additional contacts to add to our marketing database and enhances the visibility of the Energy Center's online training opportunities.

Although our residential audience has traditionally been reluctant to embrace online delivery, we did see a large number of views of our Better Buildings: Better Business Conference webcasts (a total of 2,860 views to date). This audience seems to respond largely to free, on-demand availability.

In 2009, we saw a dramatic increase in the number of paid registrations (Figure 3) for online courses (both live webinars and on-demand webcasts). This is largely due to the electronic marketing campaigns we used to advertise Energy Center University live webinars. Going live has also brought attention to our other on-demand webcasts.

Figure 3. Paid Registrations for Online Courses
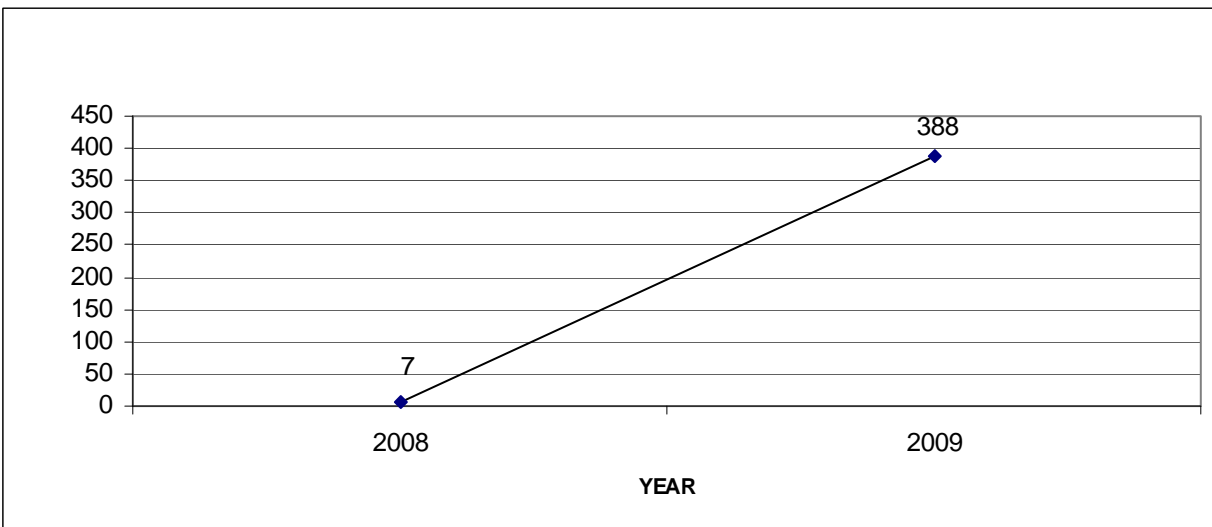
Source: Energy Center of Wisconsin 2009

Viewer Tracking and Course Evaluation

The Energy Center's rich media tool allows us to track a variety of statistics including individual views of each presentation, IP addresses of those watching, how many are watching at once, and how much of each presentation is watched. We collect this data on an ongoing basis to assess topics of greatest interest and identify presentations that might need to be updated with more current information, especially if a topic addresses technical approaches that change over time, such as building design strategies.

The tool also provides a sign-in screen to capture viewer information to add to our contact database. For live webinars, we also include the question "in addition to yourself, how many are watching with you?" This question was posed to our daylighting webinar viewers and

allowed us to calculate 855 viewers in addition to the 648 individual computer connections tracked online. Demographic information also shows us where viewers are watching, and email addresses allow us to contact viewers to follow-up after each webinar.

Each online course is also accompanied by an online evaluation form, and viewers are encouraged to complete the form immediately. Feedback from viewers is used to improve the delivery of online programs and plan future topics. At the time of our daylighting webinar, rich media was new to a lot of our viewers and many company firewalls would not allow streaming video. Comments from viewers helped us prepare a webpage that answers some frequently-asked questions and shows viewers how to test their systems before a webinar. Since the daylighting webinar, we have seen a dramatic reduction in the number of questions about the technology. Viewers are learning what they need to do to prepare. Constructive comments from viewers have reinforced the value of these practices:

- We record our live webinars for on-demand viewing. People who are unable to join us live due to scheduling conflicts or firewall issues can view the recording anytime.
- Closed-captioning is a useful addition to our on-demand recordings to assist hearing impaired viewers and provide a convenient way to search for keywords.
- Polls engage viewers and connect them with the speaker.
- Because audio quality is often difficult to control, careful testing and monitoring of the speaker's voice keeps viewers focused on the content being presented.

Online courses require a somewhat different approach to evaluation than classroom trainings. We continue to refine our process of gathering feedback from online viewers. We have learned:

- The evaluation response rate for online courses is lower than for classroom trainings, and we question whether the results represent the bulk of viewers. It is easier to ignore a link to an online survey than a staff person collecting evaluation forms at the door.
- In addition to the online survey, we receive feedback from online viewers through emails to the presenters and comments to the moderator during a live webinar. We are working toward collecting this information in a systematic way.
- During live webinars, there is no visual cue to let the presenter know if viewers are engaged. We rely heavily on survey feedback to assess the effectiveness of the presentation.
- The evaluation period for on-demand courses is indefinite and requires constant monitoring as surveys are submitted.

Conclusion

The strategy to deliver online courses as on-demand or live rich media events has given the Energy Center an edge over other educators in our industry. We continue to learn what our customers need and how technology can help us deliver training to more people with less environmental impact. Social media (including a Learning Management System approach) is another strategy we are exploring to enhance our viewers' experience. We plan to create a secure portal for individuals to access transcripts, connect with presenters and other learners, and receive notification of upcoming courses based on particular areas of interest.

According to a presentation by Forrester Research, people are demanding more and more from their workplaces (Forrester Research, Inc. 2010). Some of these demands include:

- Dynamic technology, including social networking
- Flexibility to work remotely or from multiple locations
- Challenging and collaborative work
- Education specific to one's job

The Energy Center's online trainings have begun to meet these needs, and together with our traditional classroom approach, Energy Center University is quickly becoming a source of blended learning that offers training in multiple formats to reach customers across the Midwest and beyond. Although the last few years have helped shape the direction of our online programs and armed us with the technical knowledge we need to grow this part of our portfolio, the process is always evolving. Customer feedback as well as our own flexibility and curiosity are critical components to the success of the Energy Center's online education programs.

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