Education by Design: Creating Lasting Market Behavior Change through Education & Training

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ABSTRACT

Why do energy efficiency program designers include training interventions in their programs? Because, after they identify lack of knowledge as a market barrier, they hope that training will eliminate knowledge gaps and increase energy efficient practices. Yet many programs face problems like poorly-attended trainings, difficulty in measuring effects of training, or only a small amount of market behavior change after implementing training programs.

The state of training in the energy efficiency industry is a mixed bag – excellent programs exist, and so do ineffective programs. Some training programs inspire lasting behavior change, and some seem to create no results at all. The Energy Center of Wisconsin has developed a systematic model for education and training that delivers consistent, measurable and significant results in terms of lasting energy efficiency behavior change. The system that delivers this success includes six key elements that are replicable for other market transformation programs: curriculum design founded on established adult education principles, rigorous evaluation, deliberate integration into other program elements, a focus on verifiable benefits, a solid business model, and an emphasis on quality.

This paper will examine these six principles in detail and demonstrate their long- and short-term effects over the past nine years in programs like the Wisconsin ENERGY STAR Homes training series, the Daylighting Collaborative, and the Advanced Buildings national training rollout.

Introduction

Most program designers wrestle with knowledge gaps and attitudinal barriers. What is the best way to deliver knowledge and skills to help market players adopt energy efficient approaches to building projects? Once market players know what they need to know, how can we remove attitudinal and other market barriers to making energy efficiency a cornerstone of every building project? Many program designers turn to education and training programs to attack both of these challenges.

The Energy Center of Wisconsin (Energy Center) supports and promotes education and training as a foundation for achieving long-term change in market behavior towards energy efficient building design practices and technologies. Over the last decade, the Energy Center has developed a specific approach to the development and deployment of education and training programs that moves beyond traditional information-transfer techniques. This paper will share those approaches and our results in changing attitudes and behavior towards energy efficiency in the residential and commercial building markets.

The Energy Center of Wisconsin's model for education and training programs has yielded a number of results:

- Increased demand by some market actors for high-performance building design approaches
- High customer satisfaction among training participants
- An increase in knowledge of specific energy efficient technologies and building design approaches
- Intention to apply new knowledge in subsequent building projects
- Application of energy efficient design approaches on projects several months after attending education and training programs
- Commitment to pursuing further education on energy efficiency topics

The Energy Center's approach to education and training includes six key elements:

1. Curriculum design founded on established adult education principles
2. Rigorous evaluation
3. Deliberate integration of education and training programs into other program interventions
4. Key messages focusing on verifiable benefits
5. Emphasis on the business model of each training program
6. Quality in execution

The Energy Center's emphasis on the *behavior change* of target markets rather than *information transfer* of specific technical facts forms the foundation of all training design and delivery decisions. The history and language of demand side management (DSM) programs is rich with references to technology and information transfer. The Energy Center has found that focusing on behavior change produces different design intent and improved results throughout the life of a training program. The six elements discussed in this paper all reference behavior change rather than the transfer of information.

Curriculum Design

All Energy Center training programs use principles of accelerated learning, which is founded on established theories of adult learning (Anderson, 2002). These design principles include a learner-centric approach, emphasis on retention and post-training application of new skills, and instructors qualified not only in the subject matter, but also in instructional skills.

A **learner-centric** approach to training program design manifests in several ways. A key component of this approach involves the translation of program objectives into *learner outcomes*; that is, specific, written behavioral outcomes we expect from learners after the training if the program is successful. Following is an example of an objective translated to a learner outcome:

Objective: This training will show the whole-house approach (how the house works as a system).

Learner outcome: After attending this training, participants will be able to diagnose how changes to one technical system in the house can affect other technical systems.

By focusing on what behavior changes we want from training participants, we can more easily evaluate whether we have been successful in creating that change. Keeping the learner's behavior at the center of the training program design process also facilitates an **emphasis on**

retention and post-training application of new skills as we design the program. Two design elements of this emphasis include *active rather than passive learning* and *accommodation of multiple learning styles.*

Active learning: The Energy Center has established minimum standards for the amount of time learners are engaged in passive activities (listening and looking at slide presentations – "death by PowerPoint") versus actively performing a task related to learning. We de-emphasize passive activities because they put the instructor, rather than the participant, at the center of the learning experience, thereby discouraging participants from developing ownership for key concepts and practicing new skills.[1]

Ideally, participants will actually practice in class the skill or technique program designers hope to see implemented on the next project. For the Energy Center's suite of Daylighting Collaborative training programs, this in-class practice has included performing design calculations and working with samples of lighting fixtures and tinted glass. At the end of the training program, 77% of participants indicated that they would apply information learned in their work. Follow-up evaluation of participants several months after the training indicated that participants had changed their design approach on at least one project (24%-70%, depending on the design strategy) as a result of the technical training. Design strategies included window placement, characteristics of glass, amount of installed electric lighting, use of shading devices, use of daylighting controls, and sizing of the cooling system (Bensch, 2001). The Wisconsin ENERGY STAR Homes training series includes in-field components with builder partners actually performing construction techniques learned in the classroom. Participants in these programs reported significant behavior change on the job after the training, including 46% of participants preventing and correcting indoor air quality problems, 43% improving mechanical ventilation, and 57% identifying and solving common new construction problems related to energy efficiency. 67% of participants reported changes in the way they sold energy efficient design home construction features to consumers (Bakalars, 2002). The Advanced Buildings suite of curricula, which will accompany the New Buildings Institute Advanced Buildings Design Manual, will include practice design activities, project team simulations, and completion of forms in class.

Accelerated learning theory champions active learning as critical to the retention of key content; conventional accelerated learning wisdom is that passive learning inspires around 10% content retention over time, while active learning can achieve as much as 90% content retention.[2] Specific results from Energy Center-designed programs will be discussed later in this paper.

Energy Center program design also includes activities based on the *multiple ways people learn*. The Energy Center applies Dr. Howard Gardner's theory of multiple intelligences (Gardner, 1993) in its training design, a theory widely supported and applied in the fields of corporate training and development and K-12 education. The theory's foundation is that all humans possess multiple ways of learning – visual, auditory, kinesthetic (physical/emotional), logical/mathematical, interpersonal, introspective, musical, and natural – and that programs that include more ways of learning create better participant retention and application of key concepts.

The following table gives examples of specific learning activities included in Energy Center-designed programs which accommodate multiple learning styles.

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[1] David Meier of the Center for Accelerated Learning recommends in his *Accelerated Learning Training Methods* workshop that an ideal ratio for classroom activity is 30% instructor activity and 70% learner activity. www.alcenter.com

[2] Boulder Center of Accelerative Learning, www.bcal.com

Table 1. Activities for Multiple Intelligences

Learning method	Learner activity
Visual	• Emphasis on visual aids with dominance of images rather than words • Photographs • Animated schematics
Auditory	• Paired, small group and large group directed discussion • Lecturettes
Kinesthetic	• Quotations with emotional appeal to environmental stewardship, industry leadership • Physical activity during learner activities • Facility tours
Logical/Mathematical	• Calculations • Charts & tables • Concepts presented sequentially
Interpersonal	• Group and paired activities • Focus questions between instructors and participants
Introspective	• Journaling reviews • Silent brainstorming
Musical	• Rhymed mnemonics • Music during learning activities[3]
Natural	• Meeting spaces with natural light • Outdoor activity

Evaluation

The Energy Center uses evaluation data for four purposes:

- To assess the effectiveness of our training interventions in changing behavior
- To measure customer (participant) satisfaction
- To judge how effectively training is integrated into other program interventions
- To inform future training design

The historic emphasis on evaluation in the DSM field give training program designers a variety of evaluation strategies from which to choose. The Energy Center's training data comes from the following types of evaluations:

On-Site Evaluations

The most immediate training data comes from on-site evaluations given to participants at the end of an event. The Energy Center uses a proprietary instrument which measures overall participant satisfaction both with instructional methods and with key concepts, our ability to deliver on promised learner outcomes, participants' self-assessed increase in knowledge as well as their likelihood to apply the knowledge in their next project, and customer service issues.

[3] For a comprehensive discussion of using music in training program design, see Len Millbower, Training with a Beat, www.offbeattraining.com

Year-End Analysis

Once a year, the Energy Center conducts an analysis of all education and training on-site evaluations to assess overall participant satisfaction, key trends, and sector differences. This type of evaluation allows us to compare specific training design and implementation methodologies across content areas and target markets.

Post-Event Evaluations

We have analyzed data from a number of post-event evaluations, most including phone surveys of participants. The Energy Center included post-event phone surveys in its in-house evaluation of the Daylighting Collaborative (Bensch, 2001). The Energy Center was the education and training coordinator for Wisconsin's public benefits program for a three-year pilot project and for two years of the statewide program. Because the early public benefits program included a heavy emphasis on education and training, this function was evaluated separately from other program strategies in all sectors by a third party evaluation contractor (Bakalars, 2002). These evaluations address persistence of behavior change over time – usually 3-, 6- or 12-month intervals after a training event. They also look at how well or poorly training integrates with other program strategies; for instance, participants are asked about the correlation between strategies on their building projects directly linked to the training versus other program interventions and sources of information. These post-event evaluations also help to identify remaining market barriers to implementing key measures.

Our experience has demonstrated that different evaluation strategies are effective at assessing different aspects of training program performance, and that all three are needed.

Table 2. Training Evaluation Strategies

	On-Site Evaluation	Year-End Analysis	Post-Event Evaluation
Behavior change effectiveness			X
Participant satisfaction	X	X	
Integration of training into other program interventions			X
Inform future training design	X	X	X

Participants in Energy Center programs generally report high levels of satisfaction (4.32 on a five point scale for all training programs for the 2002-2003 fiscal year, with individual residential building science courses earning a grade as high as 4.89 on a five point scale) (Bensch, 2004).

Evaluation results from the Wisconsin ENERGY STAR Homes program indicate that training participants view the overall program (including non-training interventions) as a program that will improve builders' reputations, improve the quality of homes, better educate customers, and increase builders' knowledge of what they are selling, and differentiate Wisconsin ENERGY STAR Home builders from their competition (Bakalars, 2002). 61% of these participants indicating that they would seek future training as a result of attending the training.

Program Integration

Most energy-efficiency training programs in the residential and commercial building sector are offered as stand-alone programs. While training is sometimes marketed under the brand name of utility or public benefits programs, training may not be as directly connected to other programmatic interventions as optimal. The Energy Center offers some training as stand-alone events, but we have found that designing training to embed and reference other program interventions creates more dramatic results in market transformation. Examples of deep program integration with training interventions include:

Wisconsin ENERGY STAR Homes

The Energy Center is the education and training partner for this public-benefits funded program administered by the Wisconsin Energy Conservation Corporation (WECC). In the early years of the program, we used training to build knowledge and practices around building science concepts – both in the whole-house approach as well as deep technical training in specific technologies. This led to the development of over a dozen highly technical, hands-on skill trainings that we continue to offer to the Wisconsin building industry.

The program strategy depends upon private sector consultants who recruit builder partners, perform onsite inspections throughout the construction process, and provide the home with an objective, third party performance rating after construction is complete. These consultants are also the face of Wisconsin ENERGY STAR Homes in their communities – in essence, the local evangelists for the program. As the program grew, it became clear that resource constraints would limit the program unless we could build the skill level and number of consultants.

We now work with WECC to develop both building science knowledge and training skills in these consultants, thereby creating a permanent Wisconsin infrastructure of building science experts who offer training and performance consulting services. Training interventions with consultants has included training program management staff, developing an intensive five-day consultant training course that covers building science, program marketing, and the inspection process; and a Technical Trainer's Toolbox to train industry subject-matter experts (both builders and consultants) how to change behavior when they teach.

Creating an infrastructure of skilled evangelists for the program has also formed the base of a community of practice in Wisconsin. The Energy Center manages the Better Buildings, Better Business conference to support this community of practice. While the conference offers the building science workshops and in-field sessions expected from a training intervention, it also fully integrated into other Wisconsin ENERGY STAR Homes program strategies. Wisconsin ENERGY STAR Homes builders and consultants actively participate in the planning of the conference – from programmatic direction to fundraising. Recognition of achievement in Wisconsin ENERGY STAR Homes programs is channeled through an awards banquet that happens at the conference. Leads of potential new Wisconsin ENERGY STAR Homes builders inspired by the conference are tracked, so the conference is used as a vehicle to market the Wisconsin ENERGY STAR Homes program. The conference emphasizes business skills and strategies to help high performance builders compete more effectively. Yet the conference also serves the goal of the Wisconsin ENERGY STAR Homes program as a market transformation device – the business model of the conference includes sponsorships and fundraising from

market players, so that in its sixth year (2007), it will no longer depend on public benefits funding. It currently attracts over 500 builders and remodelers from across Wisconsin.

These strategies linking training interventions directly to the development of a Wisconsin-based infrastructure of building scientists as well as to the marketing and long-term self-sustainability of the Wisconsin ENERGY STAR Homes program itself bring training beyond a stand-alone activity and make it part of a more effective overall program strategy.

Daylighting Collaborative

In Wisconsin, the Energy Center's Daylighting Collaborative used education and training interventions in the market, offering short training sessions about the benefits of daylighting as well as in-depth training on specific daylighting strategies for architects and engineers. The Energy Center also offered tours of daylit buildings and information sessions in conjunction with specific target commercial markets (eg: schools) industry events. Other market interventions included technical assistance on specific projects as well as the development of marketing materials, including virtual case studies of daylit buildings[4]. The Daylighting Collaborative has been operational in Wisconsin since 1999. Training evaluations from 2004 indicate that the program has contributed to an increase in awareness and demand for daylighting strategies (Bensch, 2003), with 93 percent of attendees indicating a strong interest in Daylighting and 40 percent indicating that the Energy Center's reputation in daylighting training influenced their decision to attend. Only 12 percent of attendees reported that instructor credentials influenced their decisions.

Advanced Buildings

The Energy Center is using similar strategies to integrate training interventions with other market interventions for the statewide commercial new construction program formulated around Advanced Buildings in Wisconsin. The program, begun in March 2004 and funded by most of Wisconsin's investor-owned utilities, targets architects and engineers with training about both the design process and specific technologies. The training is the portal through which design professionals can be connected to sales and marketing support materials for them to use when working with building owners (including a building owner's guide), technical assistance for their projects, and incentives focused both on customers and on designers. The program is in its infancy, so results are not yet available. However, the integration of program components has proven successful both with the Daylighting Collaborative and the Wisconsin ENERGY STAR Homes program.

Key Messages Regarding Non-Energy Benefits

Most program designers develop training programs to address target market actors' lack of knowledge or willingness to implement specific technical strategies for energy efficiency. While the program designer's goal is to improve energy performance, the busy professionals (architects, engineers, builders) that are the target of our programs often do not view energy performance alone as enough of a motivator to make training a higher priority than their project work. In the mid 1990's, the Energy Center event marketing messages centered around energy

[4] Virtual case studies can be viewed at www.ecw.org

savings. When we shifted to marketing messages about non-energy benefits, our average training event attendance jumped from 114 percent from fiscal year 2001 to fiscal year 2003[5]. Key messages used to promote residential training includes:

- Reducing callbacks
- Avoiding lawsuits
- Curing mold and moisture problems
- Increasing profit

Key messages in the commercial sector include:

- Increasing design fees
- Improving indoor environmental quality
- Improving building performance
- Decreasing operation and maintenance costs
- Improving productivity
- Appearing environmentally sensitive

These messages have also been effective in generating stakeholder attention for training events and conferences. While sustainability and environmentally friendly building technologies can be helpful in attracting media attention and attendance by high-profile public figures, we have also found it important to tie benefits of training events to current issues. For instance, at the 2004 Better Buildings, Better Business Conference, keynote speakers and an address by Wisconsin's Governor emphasized local job creation and economic development primarily and energy savings secondarily.

Highlighting non-energy benefits in marketing training programs helps to create participant motivation to apply energy efficient design and construction practices. Participants who can articulate this link between energy efficiency and other benefits may be more successful in motivating clients to accept and finance high efficiency approaches in their work. However, these messages do not override an emphasis on skill-based learner outcomes based on building science.

Business Models for Training Programs

Two assumptions form the foundation of the business model of Energy Center training programs. First, that training programs address program designers' desired behavior change only if there is evidence that target market actors perceive a need for behavior change (Anderson, 2002). Second, that most training, if market transformation program interventions are successful, should ultimately be able to finance themselves through market-based funding – registration fees, exhibit sales, sponsorship sales, and in-kind support (e.g.: hosting arrangements). Our experience has shown us that these two fundamentals of the training business model have allowed us to increase attendance at training events, keep individual training programs operational for multiple years, and weather changes energy efficiency funding sources and priorities over time.

[5] Energy Center of Wisconsin program metrics internal report

Developing programs that are self-sustaining in the market requires careful attention to the value proposition of training programs. Offering participants a measurable difference in their work performance by designing programs around behavior change is essential to being able to create value that participants will pay for. In essence, the learner outcome emphasizes *what* behavior change will be realized while the value proposition demonstrates *why* the behavior change is important. Using energy efficient design approaches in their projects must also lead to non-energy benefits - as discussed above – in order for participants to view a program as worth both their time and their money. Programs must also offer quality to survive the word-of-mouth test in the communities of practice we target.

Quality

While emphasizing quality throughout the program design process seems obvious, the Energy Center's quality approach draws on specific best practices from the field of training and development that enhance the learning experience, financial viability of training programs, customer satisfaction, and behavioral changes of our programs.

A key component of program quality is making sure that instructors are qualified – both as subject-matter experts and as teachers who can facilitate behavior change. The Energy Center requires that instructors for most programs demonstrate success using the program skills on design or building projects in their own projects, and that they integrate their own project experience into the curriculum. In addition, many of our instructors have participated in a Technical Trainer's Toolbox, a two-day intensive course designed to help energy efficiency subject-matter experts transition from lecture-based program design to facilitating hands-on, interactive techniques. The course allows instructors to design their own content and present it to their peers, and includes video taping of presentations. We have documented an increase in participant satisfaction with instructors after attending the Technical Trainer's Toolbox.[6]

Conclusion

In many parts of the country, funding sources for energy efficiency programs are in transition. Many sources of funding are shrinking or disappearing. Education and training programs – when focused on behavior change and adopting the other keys to success discussed in this paper – can be both viable and consistent over time in changing the way energy is used in the commercial and residential building sectors.

Education and training programs can change market demand for high performance buildings and influence design strategies, increase program participant satisfaction with energy-efficiency programs, improve knowledge and practice of specific design and construction techniques (like daylighting or ventilation), increase participants' personal commitment to energy-efficiency, and drive demand for more training in the future on energy-efficiency topics.

The Energy Center's approach to training centers on behavior change. As many as 86 percent of participants in residential building science training report incorporating one or more changes to their business practice as a result of their training participation (Bakalars, 2002). The Energy Center has been able to repeat these results with both residential and commercial building industry training by designing curriculum using established adult education principles,

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using rigorous evaluation, integrating education and training programs into other program interventions, focusing on the verifiable benefits of energy-efficiency, creating successful business models for each training program, and emphasizing quality.

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