

Creating Lasting Energy Efficiency 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. Unfortunately 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 have no impact at all. The Energy Center has developed a systematic model for education and training that delivers consistent, measurable and significant results in terms of lasting energy efficiency behavior change. This system 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 examines these six principles in detail and demonstrates their long- and short-term effects over the past nine years in programs like the Industrial Best Practices training series and the Wisconsin Building Operator Certification program.

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? Once market players know what they need to know, how can we remove attitudinal and other market barriers to make energy efficiency a cornerstone of every industrial project? Many program designers turn to education and training programs to attack both of these challenges.

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

This model for education and training programs has yielded a number of results:

- High customer satisfaction among training participants
- An increase in knowledge of specific energy efficient technologies and industrial processes
- Intention to apply new knowledge in subsequent industrial projects
- Application of energy efficient approaches on projects several months after attending education and training programs
- Commitment to pursuing further education on energy efficiency topics

The 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

Each of these elements emphasizes behavior change rather than just *information transfer* and forms the foundation of all training design and delivery decisions. By focusing on behavior change different design intent and improved results throughout the life of a training program are produced. 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 are 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 one-day training will teach participants how to take a closer look at their motor-driven systems and find ways to improve the efficiency of their processes, reduce maintenance costs, and boost productivity.

Learner outcome: After this one-day training you will be able to: find low-risk projects that can make a big impact on your bottom-line.

By focusing on the 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: 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 has been established. 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 of 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 Optimizing Fans and Pumps training which is included in our series of industrial best practices trainings, this in-class practice has included performing calculations using a glycol cooling system and working with case studies on efficient equipment. At the end of the training program, 85 percent of participants indicated that they would apply information learned in their work. The Wisconsin Building Operator Certification training series includes homework after each day of training to help participants hone in on how the lessons apply to their building or facility. Participants in these programs reported significant behavior change on the job after the training: sixty-four percent learned how to save energy in the buildings they operate, sixty-four percent became more knowledgeable about buildings generally, and seventy-nine percent increased their credibility with management. Thirty-six percent of participants reported direct changes in their operations and maintenance practices and forty-three percent of participants had a direct effect on energy consumption in their buildings (Bensch, 2002).

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 percent content retention over time, while active learning can achieve as much as 90 percent content retention.² Specific results from Energy Center-designed programs will be discussed later in this paper.

Program design also includes activities based on the *multiple ways people learn*. Dr. Howard Gardner’s theory of multiple intelligences (Gardner, 1993) in training design, a theory widely supported and applied in the fields of corporate training and development and K-12 education is applied. 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.

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	<ul style="list-style-type: none">• Emphasis on visual aids with dominance of images rather than words• Photographs• Animated schematics
Auditory	<ul style="list-style-type: none">• Paired, small group and large group directed discussion• Lecturettes
Kinesthetic	<ul style="list-style-type: none">• Quotations with emotional appeal to environmental stewardship, industry leadership• Physical activity during learner activities• Facility tours
Logical/Mathematical	<ul style="list-style-type: none">• Calculations• Charts & tables• Concepts presented sequentially
Interpersonal	<ul style="list-style-type: none">• Group and paired activities• Focus questions between instructors and participants
Introspective	<ul style="list-style-type: none">• Journaling reviews• Silent brainstorming
Musical	<ul style="list-style-type: none">• Rhymed mnemonics• Music during learning activities³
Natural	<ul style="list-style-type: none">• Meeting spaces with natural light• Outdoor activity

Evaluation

Evaluation data is used 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 demand-side management 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:

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

On-site evaluations. The most immediate training data comes from on-site evaluations given to participants at the end of an event. A proprietary instrument which measures overall participant satisfaction both with instructional methods and with key concepts is used. 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 is measured.

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. As the education and training coordinator for Wisconsin's public benefits program the Energy Center was responsible 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, 2003). 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 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 the programs generally report high levels of satisfaction: 4.37 on a five point scale for all training programs for the 2003-2004 fiscal year, with individual industrial best practices courses earning a grade as high as 4.83 on a five point scale (Bensch, 2004).

Program Integration

Most energy-efficiency training programs in the industrial 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. Training programs that exemplify this integration include Compressed Air Challenge, Steam, and Optimizing Fans and Pumps. All of these training

programs had links to programs that provided money for implementing energy efficiency projects.

Key Messages Regarding Verifiable 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 (plant managers, engineers, operations & maintenance staff) 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 work. Verifiable benefits include non-energy benefits which is more effective for marketing. In the mid 1990's, the event marketing messages centered around energy savings. When we shifted to marketing messages about non-energy benefits, our average training event attendance jumped 114 percent from fiscal year 2001 to fiscal year 2003⁴. Key messages used to promote industrial training include:

- Impact to the bottom-line
- Reduce production down-time
- Increase profits
- Increase efficiency of processes
- Decrease operation and maintenance costs
- Boost productivity

These messages have also been effective in generating stakeholder attention for training events and conferences. While sustainability and environmentally friendly industrial practices 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 series of Governor's Business Roundtables, 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 practices. Participants who can articulate this link between energy efficiency and other benefits may be more successful in motivating management and decision makers 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 productivity and reduced down-time.

Business Models for Training Programs

Two assumptions form the foundation of the business model of our 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,

⁴ Energy Center of Wisconsin program metrics internal report

exhibit sales, sponsorship sales, and in-kind support (e.g. hosting arrangements). Our experience has shown 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 in energy efficiency funding sources and priorities over time.

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. It is required that instructors for most of our programs demonstrate success using the skills they teach 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 videotaping of presentations. We have documented an increase in participant satisfaction with instructors who've attended the Technical Trainer's Toolbox.⁵

Conclusion

In many parts of the country, funding sources for energy efficiency programs are in transition. Many public benefit funds are being raided to balance budgets. 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 industrial sector.

Education and training programs can change market demand for energy efficient processes and best practices. The Building Operator Certification program has found that ninety percent of BOC students and students' supervisors say students have improved comfort, saved energy, or saved money in their facilities. (Peters and McRae, 2002). They can also increase program participant satisfaction with energy-efficiency programs, improve knowledge of specific systems (like compressed air or steam), and increase participants' personal commitment to

⁵ Energy Center of Wisconsin evaluations

energy-efficiency. Successful programs 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 93 percent of participants in the industrial sector reported learning information or skills at the compressed air training that had an effect on their day-to-day work or how they make energy related plans or decision (Bakalars, 2003). These results have been repeated with industrial best practices and the Building Operator Certification training by designing curriculum using established adult education principles, 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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