If Market Transformation is Our Goal, Programs Must Radically Change How We Do Training and Education (T&E)

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ABSTRACT

Training and Evaluation (T&E) activities are important elements of all market transformation and most resource acquisition programs. Yet, the industry and this conference have devoted very little attention to their implementation and their evaluation. This paper argues that the market transformation programs hoped for will not materialize unless there is radical change in the amount of T&E conducted and the manner in which those activities are designed and implemented. Evaluation of these activities must also be refocused and increased in effort to ensure T&E is as effective as possible. This paper outlines the authors' reasoning for why this expansion is necessary. It gives detail as to what changes are needed in how programs deliver training and how we evaluate it to make sure it is effectively driving market transformation.

Introduction

This paper is an examination of the role that Training and Education (T&E) initiatives do and should play in energy efficiency portfolios. For purposes of this paper, T&E initiatives cover the broad array of outreach activities that include training courses and educational services offered by programs to trade allies and customers in order to affect how they specify, install, maintain, purchase, or use energy and energy-consuming technologies. While the focus of this paper is mostly on training, the concepts generally apply to other activities such as school education, marketing, workforce development, mentoring, and internships. The paper also describes the principal intended outcome of these activities as a reduction in energy use; however, in jurisdictions or applications where greenhouse gas (GHG) or expanded workforce development (WFD) are the goals, these outcomes can replace energy savings and be just as applicable.

It is the authors' opinion that these types of initiatives have been vastly underutilized, in part because there is little evaluation evidence of their contribution to resource acquisition goals, and evidence available shows that the contribution is relatively low. The industry's low prioritization of resources and efforts for training coupled with the resource acquisition model of energy efficiency programming is in part the reason for evaluations' inability to quantify energy savings attributable to training activities. In turn, the inability to quantify savings may also deprioritize training programs within a resource acquisition framework.

As programs embrace market transformation (MT), T&E must assume a broader and more productive role to create the long-term and sustained behavior changes needed to meet efficiency and climate goals. This paper outlines how that role needs to be designed and the vital part that evaluation must assume in assuring that T&E activities are successful.

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The Traditional Treatment of Training and Its Evaluation in a Resource Acquisition Framework

As an industry, it does not appear as though energy-efficiency evaluators do a lot of evaluations of T&E programs. Out of the almost 2000 papers presented at IEPEC over the last 22 conferences, only eighteen papers included the word “Training” or “Education” in their titles, approximately one percent of all papers.

With a few notable exceptions that will be discussed later, training programs have not become a prominent part of a resource acquisition portfolio because they do not contribute substantial and/or quantifiable energy savings. The difficulty in assessing energy savings from these programs relegates them to the secondary program services category. Subsequently, because these programs are not expected to produce energy savings, the T&E activities are not focused on doing so. And while trainings are used to help programs realize promised savings, overall T&E programs – building a larger workforce is often deprioritized. Not surprisingly, any evaluations that are done normally find inconsequential energy saving has occurred, thus discouraging any further evaluation.

There are a few examples of T&E programs that do play a prominent role in the energy-saving portfolio and where evaluations do quantify energy savings effectively. These exceptions are glimpses into what is achievable from training and the value that evaluations can play in the success of those initiatives. The California Education and Training Centers (Centers) were instituted well before the utilities began their energy efficiency programs. In the 2003-2007 period when the Centers were evaluated collectively for the first time, they had a total budget of over $60 million, which was absorbed into each utility’s energy efficiency budget even though they were not credited with any direct energy saving. The utilities held that the Centers, with courses for trade allies and customers directed at Title-24 building codes, and code and standard promulgation championed by the Centers played an important indirect role in their resource acquisition efforts. One study estimated that the code and standard enforcement and promulgation largely supported by the Education and Training Centers was responsible for 15% of California’s statewide energy saving goal (Mahone et.al., 2005), easily justifying the Centers’ existence.

There are also exceptional examples where effective use of evaluation has allowed utilities to claim energy savings from education and/or training. The most obvious of these are the residential behavior programs that most utilities have been running for years. These programs use educational methods, particularly home energy reports, that compare a household’s energy use to comparable homes as a means to encourage customers to change their energy-use behavior. Because they are structured as randomized controlled trials, evaluators are able to claim savings. These behavior programs are an anomaly because a statistical method exists to prove their effectiveness, but they use similar messaging and delivery approaches to other – harder to quantify – T&E efforts, suggesting that one could expect similar savings for harder to quantify T&E efforts.

Other studies have successfully shown that T&E efforts can be evaluated to quantify energy savings. Early examples of studies that quantified energy savings from training efforts include work in Wisconsin by Bench (2003, 2005), The Building Operators Training and Certification (McRae et. al., 2003), and the Pacific Gas and Electric’s Tool Lending Library (Wirtshafter et al. (2005)). These studies contacted attendees of programs to determine if the training had changed their behavior in a way that resulted in energy savings. Each attendee specified how the activity they participated in led to a change in behavior, encouraged adoption of a new measure, or changed the way that specified work as a trade ally. Engineers were then tasked with estimating the energy savings associated with those changes.

Using the techniques demonstrated in these earlier studies, the California Public Utilities Commission (CPUC), in 2007-10, initiated a study to quantify energy savings from all of the Centers’ programs using the methodology described above. Opinion Dynamics (2010) estimated that the nine Energy Centers had a net impact of 544 Gwh and 6 million therms per year from end-users, and a larger but less precisely quantifiable savings to customers from market-actors who changed their specification and installation practices.

The Opinion Dynamics study was successful in that it showed the value of the Centers confirming that T&E initiatives were a major contributor to energy savings in California. The study also showed that quantifying savings using engineering calculation of self-reported changes in behavior was costly and imprecise. In the fifteen years since that study, neither the CPUC nor any other jurisdiction has attempted to replicate the approach. For the rest of the country without a legacy of energy training centers, these evaluation challenges continue to make it hard for utilities in resource-acquisition mode to expand training investment.

Role of Training under Market Transformation Directives

The large influx of MT directives across the United States are changing how T&E interventions are viewed and evaluated. In fact, T&E interventions are key elements of any MT effort. It is unimaginable to have an MT program that does not include at least one activity designed to lead to a future outcome. In fact, it is hard to conceive of any successful MT effort where <u>effective</u> training and/or education are not essential components. If programs are serious about affecting MT, they will need to radically change their T&E approaches and the ways they use evaluation. And to support T&E and program outcomes, their evaluation is paramount. The rest of this paper outlines this new T&E paradigm, and the important role of evaluation.

Expanding the Role of Training & Education in Market Transformation Initiatives

The industry must elevate the importance of T&E activities. That does not mean just pouring more money into these activities; rather, it is intentionally integrating T&E within design and delivery (as well as evaluation) and prioritizing these activities as much as other program elements.

What is needed is a completely different paradigm for the use of T&E. In guiding that approach, this paper outlines five key premises. These are:

- T&E is too important to be ignored
- There needs to be closer attention in program logic on how T&E overcome market barriers and effect change
- Success in T&E requires changes in behavior or action
- T&E efforts must be evaluated to ensure the programs are effective
- T&E design and implementation must be more focused on its effectiveness in addressing MT outcomes

Education and Training Are Too Important to Be Ignored. The old proverb, “Give a man a fish, and you feed him for a day. Teach a man to fish, and you feed him for a lifetime” is a fine metaphor for the MT movement. The saying works almost as well for our industry if we say, “Give a homeowner a rebate and you save her some energy, teach a trade ally to specify efficiency and you save the town a powerplant.” The list of MT topics where T&E are relevant is extensive. Training is needed for builders, contractors, HERS raters, installers, maintenance staff, retail sellers, realtors, appraisers, code officials, industrial producers, operators, landlords, buyers, and users. As that old proverb, long ago, and MT program design and theories illustrate today, education is many times the more effective way to solve resource issues.

There Needs to Be Closer Attention in Program Theory on How T&E Overcome Market Barriers and Effect Change. MT initiatives normally require a Program Theory and Logic Model (PTLM) or an equivalent approach that lays out the barriers, specifies interventions to overcome those barriers, and explains how program activities lead to outputs and outcomes that, in turn, potentially lead to a transformed market.

These outputs and outcomes identify measurable changes in some aspect(s) of the market that are necessary for the transformation to happen. While financial incentives can be an element, almost all MT outcomes also require some sort of training, education, or marketing to be effective. Every time a PTLM has an output or outcome that notes a growth in the number of qualified trade allies, a change in approach by a trade ally, or a behavior change by an end-user, there is almost certainly a training or education effort required for that outcome to come into effect. Most importantly, the link between the barrier and the outcome should define the focus of that training or education activity.

This concept of focused training moves away from the tendency to offer broad generalized training courses to courses more targeted to particular barriers or outcomes. It suggests that training not be strictly confined to the classroom, with more use of on-site training, apprenticeships, and mentoring. It also recognizes the need to address issues that are not strictly a matter of learning the material. For example, helping trainees with transportation to and from on-site trainings, or providing job-seeking support.

Consider the example of the California Government Partnership Programs. Recognizing the role communities play in addressing energy resource needs, the California utilities leveraged 56 partnership programs to provide energy efficiency information and services intended to result in direct and indirect energy impacts. The following figure provides an excerpt of the various activities and training efforts across the partnerships and how those translate to intended goals and metrics (Freeman et. al, 2008).

Program Activities	Program Theory	Goals	Performance Metrics
Policy Mechanisms (including codes and standards, other legislative and regulatory approaches)	Activity will overcome lack of or competing, potentially inconsistent policies on energy efficiency	Provide information on new policy and implications (e.g., benefits and penalties) to change behavior and practices	Affected parties will alter behavior and practices to comply with new policy
Education, Training, Outreach – Staff	Increasing skills and knowledge of key staff will build internal capacity to affect behavior change	Training established and delivered to key staff to change behavior	Training participants will apply acquired knowledge and skills
Education, Training, Outreach – Trade Allies	Increasing skills and knowledge of those who influence and deliver services will result in behavior change. Activity will overcome contractor reluctance to recommend energy efficiency alternatives.	Training established and delivered to trade allies to change behavior affecting what is installed at end-user facility	Training participants will apply acquired knowledge and skills. Increase in proportion of participating trade ally proposals including EE recommendations Increase in rate of EE equipment installations
Education, Training, Outreach – End-users	People are more likely to change behavior when exposed to concepts and info about opportunities	Partner promotes energy efficiency means through various means to change behavior	End user applies knowledge when decisions are made regarding energy efficiency measures

Figure 1: Government Partnership Elements that Result in Indirect Impacts (Freeman, et. al. 2008)

Success in T&E Requires Changes in Behavior or Action. This statement is the most important element of the T&E paradigm that we are describing in this paper. While awareness is the first step, change, not just awareness, is the central measure of success.

Let's spend a little more time explaining why we argue "Change, not just awareness, is the only measure of success." Some may argue that awareness must be present to effect change, and therefore activities that increase awareness of an energy-saving product or service are a necessary component. Awareness is a necessary but insufficient component. In programs that are using public good funds, the use of those funds is justified if it creates energy-saving (or GHG reductions or WFD additions) changes.

Building awareness of a product or service can be a learning object of a training initiative that supports market transformation if the training then moves the attendee to take action. It is likely for attendees to succeed in complex subjects they must either come into the course with many of the skills needed or they may need to attend a series of progressive courses designed to build participants' knowledge from novice to skilled. An attendee can complete each of those in turn, but the overall training effort is only successful if an attendee's behavior eventually changes. In a MT program, if we teach a man to fish and he doesn't fish, we have not been successful.

As we will discuss below, training that is focused on leading to action needs to be taught differently from courses designed to inform. Courses need to build the knowledge, tools, familiarity, and confidence to move the attendee beyond awareness to taking action. The course, or series of courses, needs to be designed to support the attendee post-training recognizing there are those who may have thought they understood the topic during the class, but later realize that they did not fully understand how to use the product, properly install it, or fully understand how to implement their newly acquired skills.

T&E Efforts Must be Evaluated to Ensure Programs They Support are Effective. If T&E are to become an important element of programs, they cannot continue to exist with almost no evaluation. Evaluation not only measures its effectiveness but provides a critical feedback loop to inform market needs and continuous training improvement opportunities. Furthermore, as we make this argument for how T&E programs must change, we also must suggest that evaluation of these programs needs to be different. Even if programs are not trying to assign a portion of the savings specifically to the training, collectively, regulators and program administrators are going to want to track participants' post-training behavior to assess whether the program is making the critical contribution to MT that the PTLM describes.

In the section below, we provide suggestions of how both impact and process evaluations must adapt to fit the new T&E paradigm. Most critically the primary focus of impact evaluations must concentrate on documenting whether as a result of their involvement in the training or education activity participants are changing their behavior in ways that lead to energy savings or emission reductions. Simultaneously, the focus of process evaluation must also move away from satisfaction and knowledge gain to effectiveness of the course or curriculum, the instructor(s), and the training infrastructure in affecting the desired actions.

One essential result in changing the measure of success is that it should have a direct effect on the instructors. When in the past, instructors' measure of success was enrollment (commonly called "butts in seats") or satisfaction, instructors focused their attention on making the course sound attractive and fun. Before the series of evaluations in California, the California Training Centers offered a variety of cooking classes focused on various ethnic cuisines. After the evaluations, similar courses were still offered, but the focus shifted to demonstrating how the new equipment worked and how it could save money.

The remainder of this paper explores these last two concepts: how evaluations need to be structured to encourage effective training, and how the training will need to adapt if they are to be effective catalysts for MT.

How Methods for Evaluation Must Adapt

Before discussing how evaluation must adapt to better raise and address T&E in an MT environment, it is first important to recognize the fundamental – and persistent – challenges of evaluating T&E. Most notably, evaluations have been riddled by two primary program design and implementation factors:

Challenge 1: Lack of clearly articulated goals. Goals should be well defined, specific, and outline what the program is meant to accomplish (Kellogg Foundation 2004). As outlined in a recent ACEEE paper on evaluating workforce development programs, when assessing these types of efforts goals need to be 1) specific, 2) focus on changes beyond awareness, 3) promote energy efficient behavior changes that can – directly or indirectly – lead to energy savings, and 4) are measurable in some way to show progress toward the goal. Missing one of these elements not only affects delivery, but the ability for evaluation to identify the most critical elements to research and evaluate.

The aforementioned California's Government Partnership Program Indirect Impact Evaluation cited lack of definition of the intended goals of T&E activities and target populations as limiting factors for the evaluation. An evaluation for Connecticut's workforce development efforts reinforced and expanded on this limitation, systematically assessing the quality of goals stated in those programs (illustrated in Figure 2 (Dunn, A. et. al (2022)).

Goal	Specific	Goes beyond awareness	Promotes energy efficiency behavior change	Can assess progress toward goal
Workforce development				
2019-2021 – Develop and maintain a sustainable workforce	No	Yes	Somewhat	No
Offer technical trainings to the Residential and C&I vendor community	Somewhat	Somewhat	Somewhat	Somewhat
2019-2021 - Short-term goal: Identify all workforce training opportunities and market them through the energy efficiency board's calendar, EnergizeCT website, and targeted e-mails to contractors, trade allies, vendors, stakeholders, and customers	Yes	Somewhat	Somewhat	Somewhat
2019-2021 – Long-term goal: Create a nationally recognized workforce development program by broadening outreach beyond the state of Connecticut	No	No	No	No

Figure 2: Except of Goals Assessment for Workforce Development Program

Challenge 2: Inadequate tracking data. Tracking data is a persistent issue in *all* evaluations but is especially problematic with T&E efforts. This is in large part due to the lack of emphasis on the importance of these efforts in program design and implementation described earlier which results in little to no expectation that they will be evaluated. This is understandable; attention goes to points of accountability and expectations, and if there are no expectations set to be accountable for T&E impacts up-front, then little attention will be given to ensuring all the right data is captured to measure progress. Take for example a traditional resource acquisition program. These programs are designed to achieve near-term energy savings. To verify those savings, it is important to capture every participant, the measure(s) received, and related savings. It is standard and straightforward, because if that data were not available, evaluators would not be able to verify the impacts. T&E programs that do not have this type of expectation (either direct or indirect energy impacts) may not be as inclined, or incentivized, to track their participation and outcomes so closely. This is a major flaw, especially with the increasing importance and need for accountability for T&E.

Tracking activities and outcomes are baseline needs for evaluation. Getting these right allows us to effectively shift evaluation approaches to better assess T&E. To that point, as energy efficiency programming is adapting to MT, so must evaluations. Evaluators will still rely upon the same evaluation methods and tools that have been established and used for decades, but the perspective changes from a transactional evaluation – such as measuring the effectiveness or satisfaction of one training – to market effects evaluation where evaluators assess whether interventions change behaviors and reduce barriers. This perspective change has proven to be challenging in other MT evaluations (See Dunn, Van Clock, Conzemius, and Dimetrosky, 2016). The solution is to develop, in detail, a PTLM and associated key performance metrics to guide the evaluation. As such, process and impact evaluations merge into one larger market effects evaluation that seeks to understand if 1) barriers have been reduced, and 2) whether program interventions – in this case T&E interventions, led to the reduction in those barriers.

Specifically, when establishing a T&E evaluation, particularly one supporting MT initiatives, evaluators must:

1. Ensure a detailed PTLM exists, and if not, create one with the program team that includes explanations of how T&E interventions are designed to reduce specific barriers
2. Create a PTLM framework specifically focused on the T&E efforts, recognizing different types of T&E being implemented within that framework
3. Identify measurable outputs and outcomes the assess success of T&E and program efforts
4. Work with the program team to conduct an evaluability assessment and ensure data to inform metrics for outputs and outcomes can be, and are, tracked properly
5. Longitudinally assess those measurable outputs and outcomes to ensure the program is on track to reduce market barriers

T&E market effects evaluations can differ in the data needed to track to show program effects. To that end, it is critical to systematically document the different T&E efforts, elements, and data needs. For example, a workforce development program that involves training or internships may require the program to track participants beyond the intervention. Trainees may change jobs, or email address, move to a new home or location, so a myriad of contact information needs to be obtained at the time of the intervention. Trainees should also be informed that they may be asked to provide feedback beyond the time of the intervention. Further, because T&E interventions are fundamentally behavior change interventions, critical behaviors should be tracked such as recommendation, sales and stocking practices, and hiring and other workforce development strategies both prior to (as a baseline) and after the intervention.

By necessity this impact has to be confirmed post training. This means that it is incumbent on the course administrator to acquire contact information for each attendee. While email is important, many attendees now in possession of valued skills change their employment after training. For this reason, mobile phone numbers should also be obtained.

Post-training assessments are not only used to measure impacts but also provide a powerful continuous improvement pathway for the program. It is through this research that programs can understand the market conditions and barriers (e.g., economic, perception, understanding) and how T&E approaches need to evolve to better address those barriers.

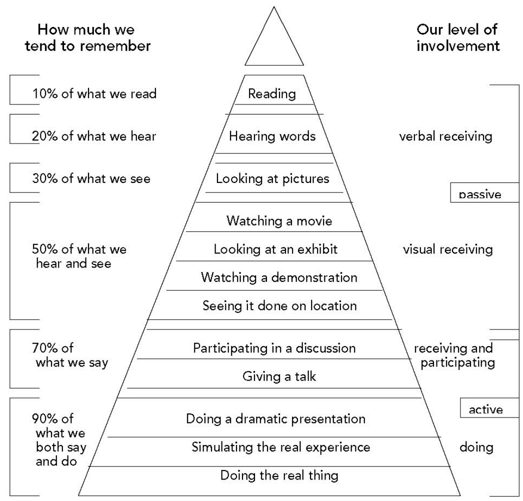
T&E Strategies Implementers Need to Incorporate for Success

There comes a point in almost every energy efficiency program where the program implementers recognize a need for training. This may occur because a new program protocol has been internally initiated, a new code or standard is developed that changes how a program must operate, new software or new technologies need to be introduced to trade allies, or an evaluation reveals issues with the techniques used in the field.

Most program implementers are not professional trainers, so they either rely on their own training experiences or hire someone to provide the services. While they may have attended many training courses in their career, it is much more likely that the bulk of their experience was their own school and college instruction. Modelling a training effort geared to adult learners on one's academic experience fails to account for the differences involved in training adults. We will discuss these differences and how training needs to adapt to meet the needs of adult learners. Let's start by contrasting how Adult Education differs from classic scholastic education.

- **Length of instruction period:** While a scholastic education course may be convened for a semester or year, a typical adult course is normally a one-time event. While adult course designers may recognize real value in designing a training course that spans a series of days; there are so many pressures on adults that only courses that offer career advancement or acquisition of a special skill can impose and obtain that level of commitment from attendees. Because courses are short events, instructors cannot rely on repeated exposure to material; nor do they have the opportunity to tutor those students who did not grasp the material when presented in class. Courses need to have ongoing feedback approaches to reinforce concepts and to answer questions posed. Post-program support also is critical.
- **Course is often secondary obligation for participants:** Learners may be out of practice, have varying degrees of experience and knowledge, and be distracted in class and burdened by other matters once they return to their jobs. They may learn valuable information in a training session and have every intention of utilizing it when they return to work, but work pressures postpone the adoption long enough to nullify the training course's value. Alternatively, they may make an effort to implement the new approach only to realize they cannot replicate the process they thought they understood when they left the class. This again speaks to the need for post-training resources. A key element of every course should be the creating of an action plan, where each attendee outlines steps they will take when they leave the class. This both helps attendees anticipate and address upcoming obstacles to adoption, and serves as a post-course motivational tool.

- **Training must reach the majority of attendees**: Unlike many college courses, success is not achieved if a small fraction of attendees excels. The goal of the class should be to maximize the impact of the course on the broadest percentage of attendees as is reasonably possible. Nor do attendees come to the class as empty vessels into which teachers can pour knowledge. Attendees come with different levels of experience and different learning goals. A course cannot cater to the minority of attendees who quickly grasp the material, either because they started with more expertise or they are able to absorb the material as the instructor presented it. Courses should be designed to focus on the specific learning objectives and needs of the attendees. This may require that courses be differentiated, either by experience or by the intended audience. While one course on a new code change could be given to both builders and code officials, the needs of each group are not compatible. One jointly-run course usually ends up not satisfying the needs of one or both groups. Furthermore, courses need to focus on the needs identified in the logic model and not generalized material. In addition, courses must cater to the variety of learning styles of attendees. As the Dade Cone of Learning illustrates in Figure 3, courses totally dependent on lectures accompanied by PowerPoint presentations have the poorest level of retention.



Adapted from Dale, E. *Audio-visual Methods in Teaching*. New York, The Dryden Press. 1946.

Figure 3: Edgar Dale's Cone of Learning

- **Most trainers have not received the training they need to teach adults**: Typically, the tendency is to approach a content expert in the field to prepare training. This expert compiles a list of concepts that a practitioner must understand to perform the job. The expert then designs a training course that covers all of that information, often merely recycling an existing course syllabus. The course is promoted, and the instructor presents the material covering everything an attendee should know on the subject. While this is simplest way to effect training, it is not focused towards the depth of learning needed to change behavior. Subject expertise should not be the sole qualifier for selecting an instructor Often, the course has too much information to allow most attendees to absorb and personalize the material into actionable practices. It also fails to recognize the diverse learning styles of the attendees.

There are many universities and private training centers that offer "Train the Trainer" programs to align instructors with the needs of adult learners. Most of the trainers used in our field could benefit from more exposure to this type of training. Recognizing that not every trainer will avail themselves of this, we have taken those concepts and summarized them into nine steps that all energy-efficiency training efforts should adopt. These concepts were assembled by Wirtshafter et al (2005) based on a Train the Trainer course conducted by Deborah Laurel, an adult training professional with 50 years of experience.

- **Recognizing the challenges and limitations to change up-front.** There are many barriers to change, rational and irrational. These barriers include perception, belief systems, and business practices to name a few. It is important to recognize and acknowledge these limitations and integrate them within the course in some fashion. This perspective, and continuing to learn and understand limitations to change, also needs to extend beyond the course to post-training and be integrated within future training content.

- **Focus courses on obtaining actions, not just transmitting knowledge**. This means identifying the desired actions before developing the course content and materials. It also means describing the intended outcomes in the marketing materials so that the course attracts the appropriate attendees and attendee expectations are met.

- **Design the course materials to meet the objectives outlined by program design documentation**. The course materials and activities should be designed specifically to meet the learner's objectives. All content and class activities should be focused on providing (or reinforcing) the knowledge and skills to the learners to result in the desired behavioral change outcomes.

- **Structure course content so that it is practical and applicable to the participants in their jobs**. Adult learners are less interested in obtaining pure knowledge than in obtaining skills and tools that they can use in their job. "Adults have a strong readiness to learn those things that help them cope with daily life effectively. Training that relates directly to situations adults face is viewed as relevant." (Biech 2005, 26) Employers are more likely to send staff to trainings that result in positive changes in how employees do their jobs.

- **Limit course (or section) content to teaching of three of objectives.** Do not overwhelm attendees with too much information at once. Adults can only process so much before all the material, including the objective, is lost. This caution also speaks to the need for frequent changes in approach. If lectures are needed, they should be short and followed by an active activity that reinforces the message of the lecture portion. Many courses include a lot of content, but an increase in course content does not translate into an increase in the amount of information that is learned. Classes can result in more behavioral change if the content is limited, but the material is learned and retained.

- **Provide opportunities for attendees to participate and exchange ideas**. Adult learners bring experience and knowledge to the classroom. Learning is increased if participants recognize their own expertise, build upon it, and share it with others in the classroom.

- **Structure courses so that they engage the attendees in active participation in order to retain information conveyed**. There is a need to move from passive learning to actively engaging the students in the learning. Engineers may prefer problem solving activities that require a calculator. Other student groups may be more extroverted and prefer interactive activities. Courses should provide attendees with opportunities to actively engage in the learning, not only by sharing what they already know, but by practicing what is being taught.

- **Build in opportunities for post-training reinforcement**. Learning is achieved when lessons are reinforced over time. "…even though something may be well-learned, if it is not used it can be forgotten." Consequently, once something has been learned, we need to increase the probability of its retention by changing the practice schedule from 'massed' to 'distributed' practice. Distributed practice means that material is periodically reviewed but with longer and longer time intervals between reviews. The classroom is the massed practice, reviewing or using class lessons in the workplace is distributed. Some instructors incorporate student action plans (as discussed below) as one method to increase the likelihood of practice. Follow-up emails, and telephone calls can also facilitate this learning. Courses also need to ensure that resources, if not direct contact with the instructor, are available when post-instruction questions arise.

- **Structure each workshop so that each attendee leaves with an action plan developed by that attendee.** Learners are more likely to change their behavior if they have a plan for how to implement what they have learned. Developing an action plan allows the learner to apply what they learned in the class to their job and determine what they need to do to make it happen. An additional benefit is follow-up evaluations can address the learners action plan to determine what changes resulted from the class and identify the barriers to implementing the plan.

Summary

T&E has been a neglected component of most energy-efficiency and evaluation activities. As programs focus more on MT this needs to change. Following the strong recommendation from adult learning specialists to limit one's message to no more than three concepts, the authors leave you with these three thoughts.

- Training and Education are too important to the success of market transformation and resource acquisition programs to treat them as the industry has done.
- Training and Education initiatives must retool to focus on effecting change, not building awareness. This will require more attention to the content and delivery of courses using best practices in adult learning.
- Evaluation of T&E has a critical role to play in defining barriers to MT and the T&E objectives that address those barriers; and measuring if T&E efforts are successfully leading attendees to take actions consistent with those objectives.

References

Bench, Ingo, 2005, "An Education and Training Evaluation that Changed a Program (PDF), IEPEC 2003.

Bench, Ingo, 2005, "Measuring Training Impacts . . . in Cyberspace: Online Surveys as a Cost Effective Evaluation Tool, IEPEC 2005

Biech, Elaine 2005 *Training for Dummies.* Indianapolis, IN.: Wiley Publishing.

Dale, E., 1946, *Audio-visual Methods in Teaching*. New York, The Dryden Press.

Dunn A. and J. Van Clock, S. Cozemius, and Dimetrosky S., 2016, "Paradigm Shift Needed! Without it, Midstream Lift Yields NTG Woes for Plug Load Programs, ACEEE Summer Study on Energy Efficiency in Buildings, 2016.

Dunn, A. and L. Kelley, R. Johnson, L. Skumatz, R. Wirtshafter, 2022, "Evaluating Workforce Programs: Toward Designing more Creative and Effective Interventions," ACEEE Summer Study on Energy Efficiency in Buildings, 2022.

Freeman, L., and K. Cooney, J. Jamming, N. Hall, B. Ward, F. Kneipp, 2008; "Government Partnership: Measuring Indirect Impacts on the Community" ACEEE Summer Study on Energy Efficiency in Buildings, 2008.

Mahone, D., and N. Hall, L. Megdal, K. Keating, R. Ridge; 2005; "Codes and Standards White Paper on Methods for Estimating Savings"; Southern California Edison in support of Statewide Codes & Standards Program Evaluation.

McRae, M and J. Peters, E. Titus, and T. Rooney; 2003, “Education That Changes Behavior: The Impacts of the BOC Program” IEPEC 2003.

Opinion Dynamics Corporation, Wirtshafter Associates Inc., Jai J. Mitchell ,and Summit Blue 2010, Indirect Impact Evaluation of the Statewide Energy Efficiency Education and Training Program Volume I of IV: Final Report, California Public Utility Commission, Study ID: CPU0014.01

Sullivan, Michael, 2015, “Impacts of the OPA HVAC Installation Optimization Training Program on Realized Energy Efficiency of Retrofit AC Systems, IEPEC 2015

Wirtshafter, R. and B Tannenbaum, G. Krietler, 2005, Evaluation of the California Statewide Education and Training Services Program Final Report, Calmac SDG0241.01; Rydal, PA 2005.