

EVALUATING THE IMPACTS OF EDUCATION / OUTREACH PROGRAMS: LESSONS ON IMPACTS, METHODS, AND OPTIMAL EDUCATION

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ABSTRACT

As evaluation of energy efficiency programs has moved toward market transformation (MT), program focus is changing toward advertising, education, and strategies to change markets and behavior, and away from direct delivery of measures. Historically, evaluation of education programs has been considered more difficult than evaluating measure- or hardware programs. This study reviewed evidence to date on evaluation results and measurement methods on education and outreach programs in energy, advertising, and resource conservation to try to gather evidence on several questions of interest to the authors: whether it is important to measure education effects, whether evaluation of these programs is cost-effective, whether satisfactory measurement methods are available, and whether it is possible to determine “optimal” education levels.

The evidence from past and related work suggests that there are significant savings effects that are provided by education, outreach, and advertising programs, and there are measurement methods that have shown strong ability to attribute the savings to these programs. Unfortunately, many of the evaluations to date have been based on relatively small sample sizes, so the results may not yet be reliable enough to consider using their results as benchmarks for other programs. The authors provide suggestions for additional evaluation designs that may be useful, suggest that detailed post- evaluations of education programs may not be the most effective expenditure of funds, and provide potentially useful lessons from related fields.

Introduction and Background¹

As energy efficiency program efforts have moved toward market transformation (MT), program focus is changing to increase advertising, education, and strategies to change markets and behavior, with less emphasis on direct delivery of measures. Prior to the MT evolution, evaluations of energy efficiency programs had focused largely on detailed billing analysis of the impacts from installed measures (usually from direct install or incentive/rebate programs). Education and outreach aspects of programs received less attention, and measurement of these impacts received relatively little attention. The interest in transforming markets has (and probably should) increased the share of program budgets that are dedicated to “softer” (non-hardware) education, advertising, and outreach efforts. Therefore, interest increases again in measuring the impacts associated with these types of expenditures.

¹ Many thanks from the authors to panel leader Loren Lutzenhiser and anonymous reviewers for helpful comments on the structure and presentation of this paper.

Historically, it has been more difficult to measure the impacts of education / outreach programs than those associated with installed measures. It has been particularly hard to untangle the education effects from measure-based effects; that is, to attribute the impacts to the proper program effort. However, it is clear that these efforts are important components of the success of programs. As an example from a related field, consider a drop-off recycling program with no advertisements about the locations of the drop-off center. Regardless of the quality of the recycling center, the program will have virtually zero impact on recycling. The trick is measuring which portion of the overall impacts of the programs can be separately associated with the education efforts.

It is attractive (and potentially justified) to say that it is clear that both components of this program are essential to its success (education and a good center). However, these days it is inevitable that the involvement of public funds means that evaluation of these program efforts will be required *at some level*, to justify the overall program expenditures, and to assess and optimize the education versus measure components.

Issues of Interest

As we considered the increasing role of education, outreach, marketing, and information programs in helping transform markets, several questions interested the authors.

Is it important to measure the impacts from education / outreach? Evaluation and cost-benefit analysis to justify program expenditures is generally a “given” in the energy field. The fact that outreach/education programs are harder to evaluate and the real or perceived shortage of historical studies attributing impacts to education programs tends to work against investments in these programs. When impacts are unknown, there is a tendency to treat impacts as if they are zero, and consequently low (and potentially sub-optimal) investment in the activity may occur. That is, education may be assumed to be “nice” and potentially “needed” to some degree, but not really a strong contributor to program impacts. If education actually has significant benefits, these programs may be under-funded. If benefits are small, we may be over-investing.

Might detailed evaluation of these programs be poorly spent expenditures? If evaluation of education / outreach campaigns is fairly complicated (and therefore, potentially expensive relative to program investments or benefits), a review of past work may help determine whether significant attention toward detailed evaluation of these programs is necessary. If past evaluation work shows that there is general agreement about the size of the benefits from major types of programs, it may be that evaluation of each upcoming education effort would be unnecessary and not well-spent money.

Are there satisfactory methods to measure education impacts? From the customer side, energy is invisible, customers lack knowledge on the topic, and energy education programs suffer from having to try to affect a wide diversity of complex and habitual energy consuming behaviors. Energy education is frequently seen by policy planners and program designers as resting on poor knowledge or weak social science theories, having uncertain payoff, being less reliable than hardware installation, and probably being unmeasurable. Some suggest it might not be possible to satisfactorily measure education impacts.

Evaluations of these programs may be scarce because it is not possible to measure the impacts with reliability.

Is it possible to identify “optimal” expenditures on education? As we increase the attention to education and outreach programs in attempts to transform the market, it may be possible that well-designed additional evaluation, new evaluation techniques, or work from other related fields may be able to provide guidance on key education program design issues or on the optimal mix of education vs. measure-related efforts. There may be lessons available that provide guidance about appropriate levels of education, forms and levels of messages, delivery methods, frequency of outreach, or other lessons from existing work or from other fields. It may be, however, that the “quality”, types, and audiences of education and outreach programs varies so much that no lessons can be gleaned from quantitative or comparative analysis.

This study was undertaken to examine the evidence to date in evaluating education / outreach messages that may help address some of these issues. Work is ongoing, but the literature review was able to yield evidence on some of these questions.

Project Approach

Literature review. The first phase of our work to examine these issues involved a broad-based literature review and interviews. The authors interviewed more than 70 professionals and reviewed more than 80 different papers related to evaluating energy and environmental outreach / education programs in an effort to discern overall trends in the effectiveness of education as it pertains to conservation-based outcomes. The interviews provide information and leads on published reports and other useful contacts. In addition, they provided an opportunity to learn about work in progress or recent results, and a chance to discuss opinions on directions these types of evaluation are taking, suggestions on promising techniques, and other topics. Our contacts and literature were not limited to energy. We reviewed work in energy-efficiency, environmental and conservation work, recycling and hazardous waste, advertising/marketing, and other fields we thought might have similar advertising / education programs and evaluation challenges.²

Limiting the scope. Education and outreach programs take on a variety of forms. Education, outreach, and advertising programs on energy issues have been designed to take place at several levels – directed toward customers, installers, the manufacturer / distributor / retailer chain, and other industry actors. In addition, many school-based education programs have been implemented. The campaigns or programs tended to have several key purposes – changing awareness, attitudes, practices/behaviors, purchases, and more. Programs with both a residential and commercial focus have been implemented. We tried to cast a broad net, but we found that the bulk of the types of programs that had historically been evaluated were

² We did not review literature in cognitive and consumer psychology, learning, or detailed behavioral literature.

mostly education and outreach programs designed for the residential customer audience (broad or participant).³

Primary research. In a separate follow-on project to our secondary research, we also undertook primary research on the topic of assessing optimal education levels. In this work, we are using quantitative methods to assess the impact of education programs on behavior, differences in impacts based on outreach method, and whether “optimal” levels of education could be identified (was there a point at which additional outreach was wasted). For a number of reasons, this work was designed to measure the impacts of education and outreach on recycling programs.⁴ Previous work by the authors showed promising results, and regression analysis is being used to analyze the results of different education levels across communities, controlling for program and demographic differences. This work is ongoing, but has proven to be a promising approach for evaluating impacts from certain types of education programs.

Results of Evaluations of Impacts

Our review of the literature indicates that early programs in energy conservation were designed on the premise that if customers could be made aware of the value of more efficient use of energy, they would change their behavior. However, these studies had difficulty finding an effect on behavior from information, in and of itself. Peters (Peters 1999) makes the point that this may be related to the fact that energy consuming behavior is complex and probably habitual, and there is not one single energy using behavior that we are trying to change. For this reason, general information strategies will be difficult to measure because of the multitude of behaviors one is trying to affect. This result is seemingly confirmed by the lack of positive results from studies in the 1970s and 1980s.

A number of studies have found impacts from these types of programs. A summary of the results of these studies is shown in Table 1. Summaries of the bulk of the individual studies are presented later in the paper.⁵

We found that the largest share of the studies worked to attribute a share of the energy savings impacts from combined education plus weatherization (or similar) programs. These studies found impacts from 0-12% from the education portion of the programs. Other studies developed sets of customers within the umbrella of weatherization and education programs to identify impacts from groups that received education-only assistance. These studies found impacts that rivaled the size of the impacts found from their weatherization only groups – 10-12% savings. Education in the form of energy usage feedback was also found to produce 13-

³ Although we also examined school-type education programs, these results are not included in this paper. In addition, we found a few studies of commercial sector impacts of commissioning and other education programs, but they are not addressed in this paper.

⁴ This work is being conducted under a grant from the State of Iowa Department of Natural Resources.

⁵ These studies provided quantitative or applicable methodology information. The remainder of the 80 papers did not provide quantitative results or had fewer applicable lessons for this research.

15% savings in the studies we reviewed. Research on the impacts from energy centers and other similar educational efforts is also showing impacts.⁶

From related literature, we also find useful lessons. Advertising studies have historically focused on decision points and changes in attitudes and awareness. They less commonly publish work attributing product sales differences to advertising or education campaigns.⁷ However, the widespread availability of scanner data is increasing measurement and attribution of impacts in this field. Short paybacks from specialized campaigns are expected, but manufacturers report they advertise for reasons well beyond increased sales, which may or may not be applicable to energy programs. In the recycling field, impacts seemed to differ based on whether the messages were general (we have a recycling program) compared to whether they addressed a more specific message (we have added a material and this is what you do with it; or you need to move your cans closer to the curb). These findings may imply that general efficiency advertising may not be nearly as effective as energy advertising targeted toward one specific action.

Table 1. Summary of Quantitative Results from Studies of Educational Impacts

Educational Action	Effect	No. of Studies Reviewed
Education plus Measures	0-12% additional savings impact due to education, increased satisfaction.	15
Education Only	10-12% savings impact.	2
Energy Usage Feedback	13-15% savings, increased satisfaction.	5
Advertising and Marketing Campaigns	Recall ranges from 25-80%. Purchase intentions 0-5%. Advertising dollars should be proportional to market share.	7
Energy Centers and Other Methods	30-40% market penetration. 9,000-23,000 MWh/yr savings. Centralized broker increases penetration.	8
Recycling and Hazardous Waste Education	0-2% increase in overall diversion, 0-50% increase in specific material recovery increase in participation. HHW most effective when barriers are addressed and goals set.	9

It may be that results from recycling or product advertising are not completely applicable to the energy field. Product advertising is based on the “branding” (identity construction, reputation building) of relatively indistinguishable commodities, but they are commodities that can be touched and seen. Recycling involves concrete behaviors with tangible end results (turning materials into other materials). Energy is relatively invisible, energy use is invisible, and the effects of actions are hard to detect (Lutzenshiser, 2000). These are important differences, but there are also important similarities. In both recycling / source reduction and energy conservation, the purpose is to use less material, with overtones

⁶ Peters (Peters 1999) also reports recently finishing work that was able to attributed impacts from a program that had an interactive museum exhibit, a similar type of program, although clearly geared toward a different audience.

⁷ Interviews have produced case studies of effects on product sales.

of green or environmental ethics. Advertising for energy products and services and educational messages have to compete with those for general products to capture end-user's attention. While there are differences, lessons may be useful, at least in an illustrative way.

Summary and Suggestions on Evaluation Methods

We also reviewed the evaluation methods used for studies that reported quantitative results, or for studies that discussed quantitative methods. The general findings are shown in Table 2. The key methods used in the studies we reviewed are listed in the table. From this review, a few suggestions arise.

Field	Evaluation measurement methods used
Energy studies	<ul style="list-style-type: none"> The vast majority of the studies that were conducted on energy education have relied on the same basic techniques – pre and post billing analysis, usually with a control group (other community) or a treatment group that didn't receive education.
Advertising and Marketing	<ul style="list-style-type: none"> They use a variety of focus group and survey methods to examine success at points in the decision-making process, including recall, intention, etc. Used to track quality of copy; strong correlation between intention and purchase reported. Much tracking of numerics like advertising exposures, etc. Pre- and post- campaign scanner data is used, often “controlled” by data tracking agencies that purport to address baseline issues. Comparisons between special groups of communities that have been randomly assigned different cable feeds that allow inclusion / exclusion of ads from groups within the same community.
Recycling/waste management	<ul style="list-style-type: none"> Much work is fairly primitive, using pre- and post-campaign measurements on recycling rates, often without control groups
Suggestions	<ul style="list-style-type: none"> Consider additional work using quasi experimental designs using different communities as treatment and control groups (Peters 1999) Consider gathering cross section information from programs from multiple utilities and use regressions to control for differences in programs and educational methods, a method that may show promise for teasing out educational effects Consider more frequent use of some of the softer advertising techniques including focus group tests of intentions to purchase to test campaigns and educational materials for effectiveness up-front. Consider evaluating several “template” programs, and using their results across utility areas.

Impacts appear strong from education components from weatherization and education programs and from some other work, but sample sizes are generally quite small. A few similar treatment group studies should be conducted, but with larger sample sizes to nail down the size of the impacts.

Experimental designs that use different communities as control groups have shown limited success in energy applications. This approach may be applicable for additional measurement of energy education effects. Some of the designs used by advertisers

(including the split cable systems) may provide useful and reliable methods for examining the impacts of energy education and advertising programs. Those studies that attempted to measure impacts of education only programs had to use very intrusive measurement techniques that may have themselves, affected the results (Peters 1999).

Using cross section regression analysis methods to examine the impacts of education / outreach programs may be fruitful. The authors are finding in their preliminary work that compares communities with different levels of education (and no education) controlling for program and demographic differences shows promising results in attributing educational impacts. This may be similarly applicable across utility areas.

The advertising field provides some interesting examples. They tend to spend much more money testing ads up front to get maximum effect, and report spending little to nothing (!) tracking impacts after the fact. Skeptics may argue that they may not want to know the answer after spending that much money, but certainly there are elements that if there is a strong correlation between tested intentions and purchase behavior (which they report), it may be that spending the money tweaking the message up front may be some of the most cost-effective expenditures of funds. Similarly, the advertising field tracks numerous ongoing measures (advertising exposures in target groups, etc.), and conducts extensive focus group work that may be sufficient for some energy education program efforts.

Generally, given the complexity of finding control groups, and of controlling the recipients of information, it may be worth examining whether detailed evaluation of all education programs is important or cost-effective. If programs are reasonably similar, evaluation may not be needed for each program, especially if the focus is to conduct the level of evaluation needed to 1) assure money is being spent responsibly, and 2) provide the level of accuracy needed to guide program decisions or avoid expensive wrong decisions. This second item does not always need precise information. Instead, several good "template" programs could be evaluated, and their results applied in "orders of magnitude" to other programs. Focus group work to control for quality of the program materials may then be the most effective use of the evaluation funds.

Literature Review

In the following sections we provide a brief review of some of the literature of interest in the various areas that we addressed above.

Adding Education to Weatherization Programs

Throughout our research, we found the most common topic of study to be how energy efficiency education affects the savings associated with weatherization programs. The bulk of these studies had been done on low-income weatherization programs but we also found studies conducted in the multifamily sector, studies measuring the effects of energy education versus weatherization, and studies measuring the persistence of energy savings in weatherization programs attributed to education. Generally speaking, adding the education component to a low-income weatherization program resulted in 0-11% in additional energy savings per household. Paybacks ranged from less than 1 year to over 14 years.

Each study employed roughly the same methodology. A control group would receive standard weatherization service while a test group would receive weatherization plus

education. Some studies also used an additional control group that received no services whatsoever. It should be noted that several of these studies suffered from small sample sizes and therefore their results may be unreliable. A brief summary of the reviewed studies is provided in Table 3.

Table 3. Weatherization and Education

	Savings Attributed to Energy Education	Comments
Quaid- 5 study summary of	0-11% savings on energy bill.	Low-income weatherization and education program. Treatment groups received weatherization and energy education. Control groups received weatherization only.
Harrigan-Niagara-Mohawk Power	2.6-2.9% decrease in electricity consumption. 11-12.1% decrease in gas consumption.	Low-income weatherization and education program. Treatment group received weatherization plus energy and personal finance education, and some received feedback devices. Control group received weatherization only.
Community Action Team-St. Helens, OR	3.7 kWh per day decrease in electricity consumption.	Low-income weatherization and education program. Treatment group received weatherization plus energy education. Control groups received either weatherization only or no services. Unreliable results due to small sample size.
Dunsworth-Neighborhoods Energize Wisconsin	4.3% (72.4 ccf) significant at the .001 level. \$80 per participant payback was 1.9 years.	Neighborhood energy education and action programs. Study followed participation of 110 households. Overall 23,000 households participated.
Gregory- Client Education Pilot Program	6.7% energy bill savings significant to the .01 level. \$57.43 per household per year. Payback was 10.3 years.	Low-income weatherization and education program. Treatment groups received weatherization and energy education. Control groups received weatherization only. Large sample sizes.
Reynolds- Blue Mountain Action Council	10-12% savings for education only. 10-12% savings for weatherization only.	Low-income weatherization and education program. Treatment group received education only while the control group received weatherization only.
Harrigan-Alliance to Save Energy.	First year savings of 10.1% while third year savings were still at 7.5%. Education and energy efficient measures have the same persistence.	Third year follow-up of weatherization plus energy education study. Treatment group received weatherization plus energy and personal finance education, and some received feedback devices. Control group received weatherization only.
Financial Energy Management, Colorado/HUD-Boulder and Colorado Springs	Modest consumption decreases in the education groups.	Multifamily weatherization and education program. Treatment groups received education only and education plus weatherization. Control groups received weatherization only or no services. No significant results due to small sample sizes.

Customer Feedback

Providing customers with feedback over time on their energy consumption habits was another form of education / outreach we examined. Studies in the early 1980s provided evidence that there were significant responses to time of use rates (McDonald, 1999). More recently, there have been several studies conducted that have tried to determine whether customer feedback can result in meaningful energy savings. Three of the four studies that we analyzed employed a treatment group that received consumption feedback and a control group that did not. The studies that we included are summarized in Table 4 below.

Table 4. Providing Customers Energy Usage Feedback

	Savings Attributed to Feedback	Comments
Garray et al- Helsingborg Energi	Increased satisfaction but no savings.	Four treatment groups received energy bills that provided consumption feedback and usage comparisons. Four control groups continued to receive the same bill.
Dobson- Ontario Hydro	13% reduction in daily energy consumption.	Treatment group used a computer program which offered customer specific energy education. Two control groups, one which was aware they were being monitored and one that was not
Dennis, et al.	13-15% savings in energy consumption for group with consumption feedback and goals	Group one received energy usage feedback, group two set goals, and group three did both activities.
Puget Sound Energy	120 kWh energy savings	Participants completed a Personal Energy Profile and then received recommendations for reducing energy use.

Advertising Campaigns

Advertising campaigns have been used to create awareness among consumers, change their behavior regarding energy consumption, and steer them toward buying or installing energy efficient measures. We analyzed many studies that have tried to measure the overall impacts of advertisements with energy-efficient themes. These studies used a variety of methods to measure energy reduction due to advertising, gauge purchase intentions, measure customer recall of advertising, and assess energy outreach evaluations (summarized in Table 5).

Few of the straight product advertising studies we examined attributed actual purchases to the advertising, although interviews have turned up case studies. However, many studies in product advertising do report results in terms of increased intentions to buy, or similar results. Although most of the reported work shows impacts on persuasion and intentions, corporate research has shown high correlations between persuasion scores and increases in sales – on the order of 70%. Advertising interviewees made it clear that advertisers expect to have campaign expenses pay back in increased sales in short order (less than a year). However, manufacturers report they advertise for reasons other than just increased sales, including brand retention, and competition with other manufacturers. This type of advertising may or may not be appropriate for energy efficiency applications.

Table 5. Effects of Advertising Campaigns

	Results Attributed to Advertising	Comments
Keane and Tiedemann- BC Hydro	20 GWhr/yr overall savings. Market penetration of energy efficient behaviors ranged from 1 to 13%.	This was an evaluation of two-year advertising campaign called the Power Smart communication initiative.
Peters, et al.	Purchase intentions increased 5% for low flow showerheads and 1.5% energy efficient water heaters.	The Ajzen theory of planned behavior was used to analyze purchase intentions. Treatment group received energy education while the control group received no services.
Tiedemann and Nelson- BC Hydro	71% demonstrated unaided recall of promotions.	Group one received energy usage feedback, group two set goals, and group three did both activities.

Education Delivery Methods

Table 6 shows that many methods have been employed in the attempt of reaching customers and connecting with them with the intention of changing their behavior, in terms of energy efficiency. Throughout our review we noted those studies that indicated which methods of outreach and education seemed to have the most success.⁸ These studies discussed tips on effective energy efficiency education, the effectiveness of energy centers, central Demand Side Management brokering, and using environmental themes to market energy efficiency.

Effects Of Education and Outreach on Recycling Programs

In an effort to provide information useful to energy education and outreach program design, we examined the impacts of education and outreach programs in areas besides energy. We found recycling and household hazardous waste programs that had employed education campaigns to increase recovery rates, overcome socio-economic factors, and improve customer understanding of proper disposal practices. We also found studies that described methods used to successfully induce behavior change, summarized in Table 7.

⁸ There have been several interesting studies examining the impacts of K-12 and other education programs geared toward student curriculum. Some work conducted on the "Energy Source Program" (Niedermeyer, 1999) notes differences in attitudes and reported energy behaviors and estimated the impacts as 70-80 kWh per year for the program. Recent work for Wisconsin Electric (Peters, 1999) examined the impacts of a display in a children's museum and found a positive and measurable effect from exposure to the interactive exhibits.

Summary

In this paper, we attempted to review the experience to date evaluating the impacts of energy education, outreach, advertising and marketing-type programs. We interviewed numerous program evaluators in energy and related fields, and conducted an extensive review of the literature. We concluded that the evidence indicates that energy education does have a significant impact on energy use, and that the impacts seem measurable. However, small sample sizes have hindered the reliability of some of the existing work. There are satisfactory methods available to measure the attributable impacts, but these methods may be expensive and it can be complicated to set up good control groups. Therefore, there may be a rationale for conducting good evaluations of a few template programs, and applying these results in other areas, if that is deemed acceptable. This might be used in developing broad guidelines for expenditures on energy education vs. measures in programs. As a substitute, additional pre-testing of materials for quality and resulting changes in intentions (as they do in advertising) may be a useful and cost-effective evaluation approach for most programs. Finally, we made a few suggestions for evaluation methods that may be appropriate for these programs, and look forward to demonstrating some technique in some in-progress work.

Table 6. Energy Centers and Other Delivery Methods

	Findings	Comments
Szabo, et al- NEW	Households with lower age groups are more apt to link energy efficiency to the environment.	Participants in an energy education campaign were asked to indicate reasons for participating. Two groups consisting of those who indicated helping the environment and those who did not.
Scherzer- ACEEE	Individually based energy education is the most effective	Author compiled anecdotal information.
Haeri and Jennings- Energy Partners Program	Outreach should be tailored to the specific conditions of the community. Advertising and cold calls are recommended for more concentrated urban communities.	Examined 3 pilot low-income demand side management programs consisting of 800 households each.
Reed, et al.- PG&E's Pacific Energy Center	Market Penetration 30-42%	Survey of 216 users of Pacific Energy Center services.
Work Paper on Energy Impacts from Energy Centers- PEC, CTAC	22,781 MWh net impacts for lighting. 9,286 MWh net impacts for HVAC actions.	Compiled from market effects studies on the Pacific Energy Center and the Customer Technology Applications Center.
Karl, et al.- WDSO, WECC	The existence of a central broker that handled mass media messages promoting energy efficiency can make better use of funds, better market preparation, and better coverage.	Evaluation of a joint utility regional marketing campaign.

Table 7. Effects of Education and Advertising on Recycling and Household Hazardous Waste Programs

	Results Attributed to Education	Comments
Ligon, et al.- MA DEP	Education background directly affects recycling rates but education and outreach can overcome existing socio-economic factors.	Evaluation of 4 recycling programs in Massachusetts.
Read	Door-to-door recycling education increased diversion by 2 percentage points	Pre- and post-treatment tonnage measurements.
Mitchell and South	Door-to-door recycling education increased the recycling rate by 10 percent	Pre- and post-treatment tonnage measurements.
McKenney and Hruska	Specific material recovery rates improved from 6-50%	Evaluated material specific advertising campaigns in four communities in Ontario
Cascadia- King County Wastemobile	In-person education resulted in a 12% increase in behavior change, a 21% increase in comprehension, and a 44% increase in comprehension.	Treatment group received in-person HHW education for a trained Education Specialist. Control group received standard education materials.
McKenzie-Mohr- Halifax Regional Municipality	Education campaigns that address barriers to change significantly increase preferred behaviors. "Pledges" or honor commitments also increase the impact of the campaign.	Author compiled anecdotal information.
Frahm, et al.- Local Hazardous Waste Management Program of King County	Steps for changing behavior include defining the objective, audience selection, learn about the audience, address barriers to change, develop strategies, and develop a method to measure effectiveness.	Based on an extensive literature search on changing behavior in energy conservation, recycling, health education, and other fields.
Hartman- City of Seattle Solid Waste Utility	Raised the percent of residents properly setting out their garbage and recycling containers from 80% to 95% in 3 weeks. This improvement was retained	Personal communication with author.

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