J. ENVIRONMENTAL SYSTEMS, Vol. 10(1), 1980-81

EFFECTS OF A PRESIDENTIAL PROMPT ON ENERGY CONSERVATION IN COLLEGE CLASSROOMS

PAUL D. LUYBEN
State University of New York
College at Cortland

ABSTRACT

A high salience prompt was used to reduce energy use in college classrooms. A letter, personally signed by the President of the College, was sent to each of ten professors who taught prior to an unscheduled period. The letter informed the professor that he or she taught prior to an unscheduled class and requested assistance in turning off the lights. A multiple baseline design was used. The results showed a 39 per cent increase in lights turned off after the prompt. The significance of this finding is discussed and subsequent research suggested.

Increasing costs of energy have significantly affected the operations of colleges and universities in recent years [1]. Total energy costs are consuming increasingly large proportions of operating budgets with increases continuing with each year. Furthermore, while electrical energy use only accounted for about 20 per cent of the total energy used, costs for electricity accounted for 55 per cent of the total energy bill. Most colleges have already made technological changes to conserve energy (e.g., selectively reducing lighting, redesigning heating systems, etc.); yet, little or no progress has been made in changing behavior patterns which consume energy. For example, changing vacation schedules from summer to winter and switching off unused lighting would conserve energy [1].

With regard to lighting, a recent survey of unscheduled and unoccupied college classrooms found that lights were left burning in 24 per cent of the classrooms studied [2]. It was estimated that 300,000 watt-hours of electrical energy are wasted in this college per week in unscheduled classrooms, or nine

doi: 10.2190/1JK6-QWGM-RFK8-V1KP
http://baywood.com

million watt-hours per academic year. Nine million watt-hours is a conservative estimate because it does not include:

a. two buildings which housed a number of classrooms;
b. art and music studios;
c. faculty and administrative offices;
d. laboratories;
e. gymnasiums;
f. public areas; and
g. intervals between classes.

The purpose of the present research was to assess the effects of a procedure designed to reduce the unnecessary use of lighting in college classrooms.

The failure to turn off lights may reflect users' indifference to energy shortages and needs. However, an alternative analysis suggested that leaving lights on after a class is an appropriate response in most instances, since many class periods are followed by subsequently scheduled classes. Turning the lights *off* after a class, and then *on* again for a subsequent class would use more energy than leaving the lights on for the ten or fifteen minute period between classes (*Energy Facts,* Note 2). Therefore the failure to turn off lights may be attributed to the absence of a cue or prompt indicating that the lights should be switched off at that time. If this analysis is correct, then providing such a prompt should enable classroom users to respond discriminately.

A number of studies have examined the effects of prompts (e.g., verbal reminders, notices and flyers) [3–5] and information brochures [6] on electrical energy consumption. Generally, prompts have been found to be relatively ineffective in reducing electrical energy consumption. However, a recent study conducted in a college classroom found that large poster prompts were quite effective in reducing the per cent of days in which lights were left on after five p.m. [7]. Unfortunately, the use of only one classroom, where data was collected late in the day, limits the generalizability of the findings.

It also appears that while prompts have been used to encourage pro-ecological behavior, the "salience" of the source of the prompt for the subject appears to have been considered only to a limited extent. For example, Palmer, Lloyd, and Lloyd found that a prompt from a high status source (i.e., a letter from the director of the state energy office) was no more effective than were prompts from a low status source in reducing electricity consumption. Unfortunately, as the authors pointed out, the government relies to a considerable extent upon "official" appeals from persons of high status to reduce energy consumption. Their data indicate that this approach is not likely to be effective and they suggest that the strategic use of consequences may be more effective.

An alternative view is that while prompts from persons of high status may not be particularly effective, prompts originating from persons who occupy high status *and* who controls one's reinforcers may be effective. In the Palmer *et al*

study, while the director of the state energy office held a position of high status, his control over the reinforcers of the ordinary citizen were probably perceived (by those citizens) to be remote at best. In the present study, it was hypothesized that high salience prompts (i.e., prompts delivered by persons of high relative status who also directly control one's reinforcers) would be effective in reducing energy waste.

In the experiment reported here, the effects of a high salience, informational prompt on the frequency of lights left on in unscheduled college classrooms were examined.

METHOD

Subjects and Setting

Thirteen "target" classrooms were identified. The criteria for selection were that:

a. a scheduled class immediately preceded an unscheduled period in that room;
b. an observer could arrange to observe the classroom at the end of the scheduled class period; and
c. the lights had been turned off on less than 50 per cent of the occasions during preliminary observations.

Of the thirteen classrooms identified, one was dropped because the professor left the college; his students were subsequently assigned to other sections of the course. Of the remaining twelve classes, six which met three days per week were grouped, while the other six classes which met two days per week composed a second group.

Observational Procedure

At approximately ten minutes before the termination of a target class period, an observer was stationed unobtrusively outside the room. When the professor left, the observer would record whether the professor switched off the lights. (Faculty response was selected as the dependent variable because faculty could be readily identified as users of the room, individually prompted and their specific responses observed.) On three occasions when the professor was heard to remind students to turn off the lights, he or she was credited with having turned them off.

Reliability

Independent reliability observations were obtained on ten occasions throughout the study. Interobserver agreement was 100 per cent using the formula agreements/agreements + disagreements, X 100.

Experimental Procedure

The experimental condition consisted of a high salience prompt, which was a personal letter from the President of the College addressed to the individual faculty member and delivered to his/her mailbox. The prompt, typed on presidential stationery and personally signed by the President:

a. reminded the professor of the need to conserve energy;
b. informed him/her that lights were being left on in unscheduled classrooms; and
c. asked for assistance in making sure that the lights were turned off following his/her class.

The class location and time were specified. A week later a follow-up prompt, a short unsigned dittoed note which urged the professor to turn off lights after his/her class, was delivered to the professor's mailbox.

The letter from the President was defined as a high salience prompt because the President occupies a position of high status relative to faculty and also has ultimate control over the allocation of resources within the college.

Experimental Design

A modified multiple baseline design was used in which implementation of the prompt phase was contingent upon completion of approximately ten baseline "data days" (i.e., days in which data was collected). This is in contrast to the usual procedure in which the treatment is implemented in the second and third settings after a stable change is achieved in the first and second settings, respectively [8]. The decision to modify the design was due to limitations in the number of observations (i.e., class hours) available in the term, in conjunction with the relatively large number of classes targeted for intervention (i.e., six in each group, instead of three or four as is usually the case). The number of observations available was limited for two reasons. First, the need to select classes which usually left lights on meant that several weeks of preliminary observations of many classrooms were necessary before the target classrooms were identified and data collection on the professor's behavior could begin. Second, due to the high rate of missing data (classes were frequently dismissed prematurely, scheduled elsewhere or cancelled), it became apparent that neatly staggered phases across the six classrooms in each group could not be completed within the time limits of a single semester. (In fact, it turned out that two classrooms had very few data points in the prompt phase for precisely these reasons.)

RESULTS

Figure 1 presents the data for the group of classrooms which met three days a week, while Figure 2 presents the data for the group which met two days each week.

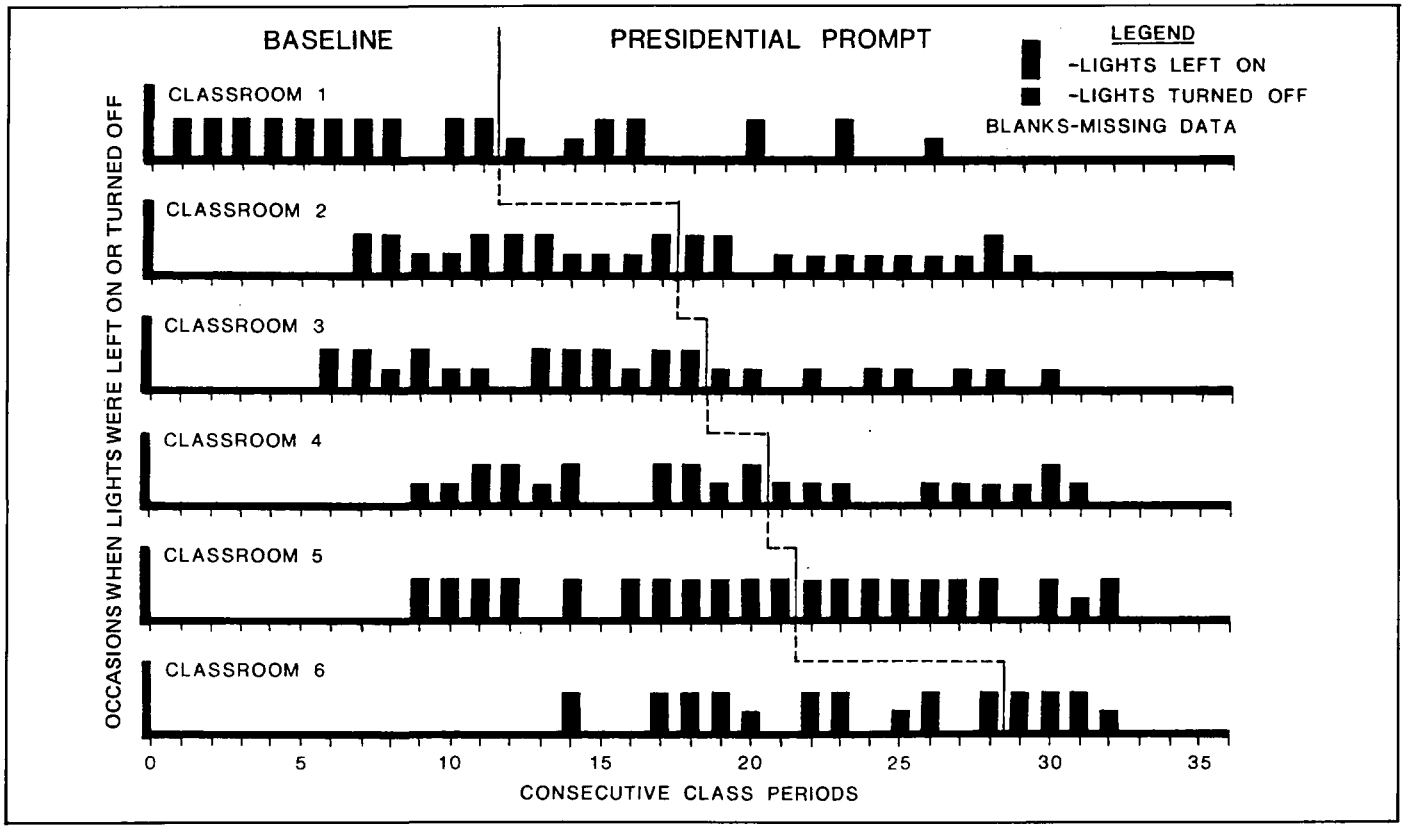

Figure 1. Occasions when lights were left on or turned off in six classrooms which met three days per week.

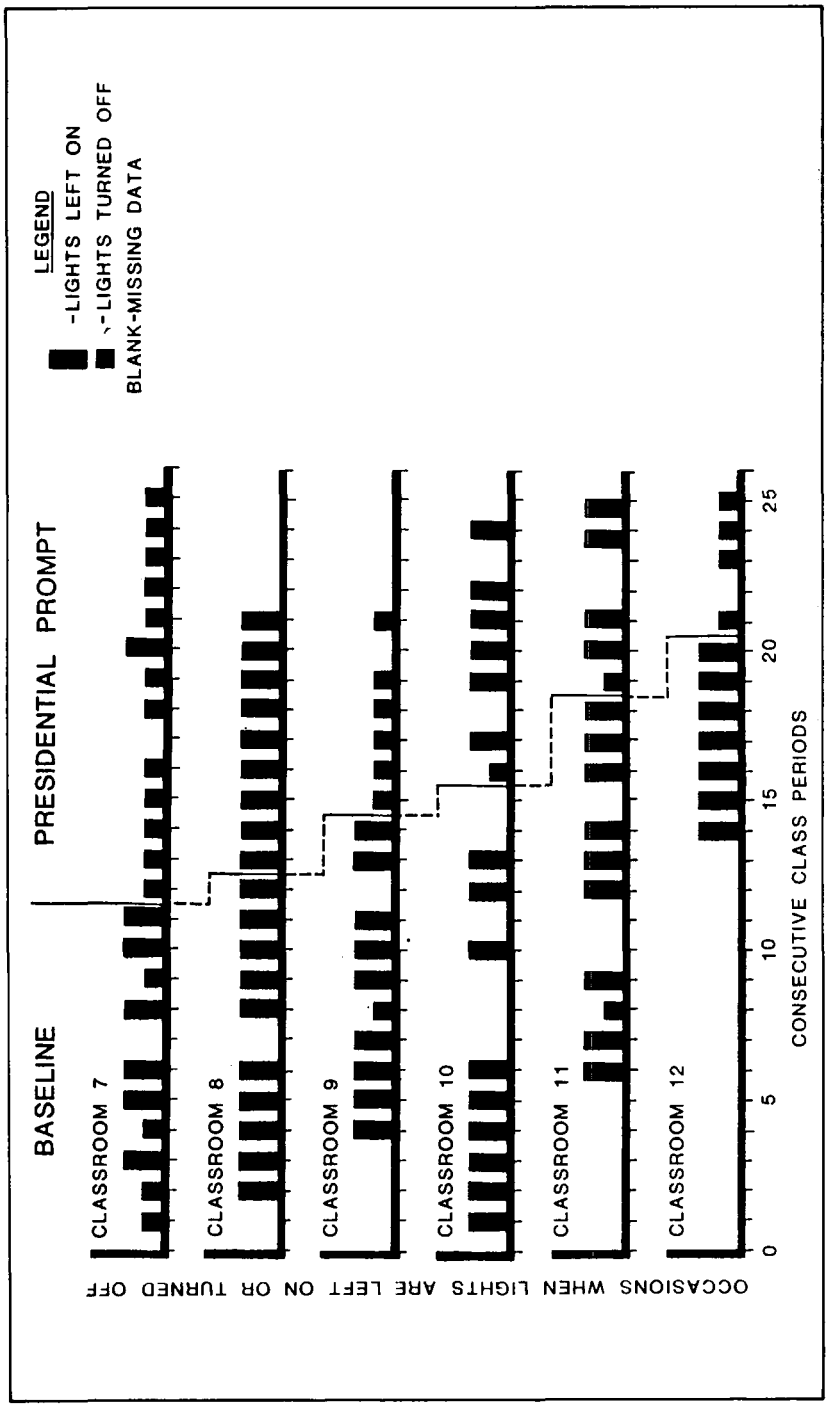

Figure 2. Occasions when lights were left on or turned off in six classrooms which met two days per week.

These data show that substantial reductions in the occurrance of lights left on were obtained in classrooms 2, 3, and 4 (Figure 1) and 7, 9, and 12 (Figure 2), with much less or no change in classrooms 1, 5, and 6 (Figure 1) and 8, 10, and 11 (Figure 2). Summarizing across Figures 1 and 2, the lights were turned off on only 18 per cent of possible occasions during baseline, but were turned off on 57 per cent of occasions after the prompt. The difference represents an overall increase of 39 per cent in the proportion of classrooms with lights turned off after the Presidential Prompt. Figure 3 presents the data collapsed across all the classrooms for the ten days before and after delivery of the presidential prompt.

Of particular interest is the fact that the data represent class meetings, and not consecutive days; thus, in real time, the experimental phase was in effect for as long as seven weeks (median of 4.5 weeks and mode of 4 weeks).

The Wilcoxen matched-pairs signed-ranks test was used to compare percentages of lights turned off in baseline and prompt phases. The difference was statistically significant at $T(10) = 1.5$, $p < .01$ [9]. (Classrooms 6 and 10 were omitted from this analysis because only four data points were obtained in the prompt phase. This was due to the problems of selection and missing data mentioned above. The irregular starting days across classrooms are also attributable to the same cause.)

DISCUSSION

The results indicated a rather large and surprisingly persistent effect of a minimum prompt procedure. These findings are impressive not only because just two prompts were used, but also because the notices were both physically and temporally separated from the actual target response. That is, the notices were received in the professor's mailbox and were not delivered in the classroom at the end of the target period.

The strong effect achieved here may have been due to the fact that the letter was signed by the President of the college. As a high status personage in the college community, the fact that he personally signed the letter may have been influential in drawing attention to the message. On the other hand, it is possible that the effects achieved here are due entirely to the fact that professors were informed that their lights should be turned off at that particular time. Information alone may have been sufficient to enable professors to respond discriminately. Because the informational and salience aspects of the procedure were perfectly confounded, it is not possible to state which of the two was the more important variable.

In addition, the fact that only thirteen highly selected subjects were included limits the generalizability of the findings. Subsequent research is needed not only to compare the relative effectiveness of high and low salience prompts, but also to assess the effects of these procedures on a larger, more

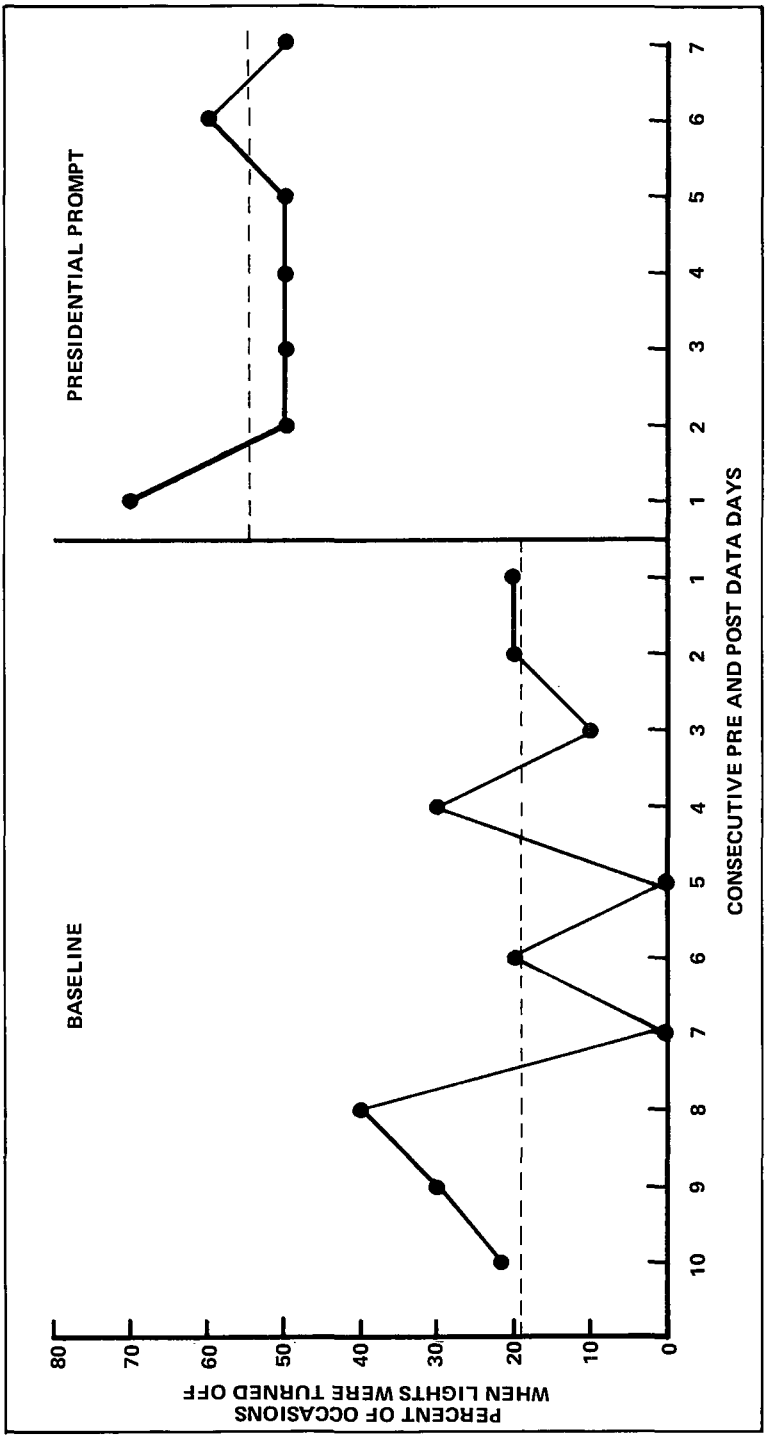

Figure 3. Per cent of observation periods in which lights were turned off before and after the Presidential prompt.

representative sample of the population of college instructors. Subsequent research should gather direct evidence on the actual energy savings achieved through the use of these procedures. In this way a benefit/cost analysis could be completed and the real contributions to alleviation of our energy crisis assessed. It seems clear, finally, that research of this type is needed because even though electrical energy waste in college classrooms accounts for a very small proportion of our total energy problem, even small sources of waste, if widespread and systematic, can result in significant energy losses [1, 10].

REFERENCES

1. F. J. Atelsek and I. L. Gomberg, Energy Costs and Energy Conservation Programs in Colleges and Universities: 1972-73 – 1974-75, *Higher Education Panel Reports,* Number 31, American Council on Education, Washington, D.C.
2. P. D. Luyben and J. E. Luyben, Effects of a "Presidential Prompt" on Energy Conservation in College Classrooms, Paper presented at the Midwestern Association of Behavior Analysis Annual Convention, Chicago, May 1977.
3. M. H. Palmer, M. E. Lloyd, and K. E. Lloyd, An Experimental Analysis of Electricity Conservation Procedures, *Journal of Applied Behavior Analysis,* in press.
4. R. Kohlenberg, T. Phillips, and W. A. Proctor, Behavioral Analysis of Peaking in Residential Electrical Energy Consumers, *Journal of Applied Behavior Analysis, 9,* pp. 13-18, 1976.
5. S. C. Hayes and J. D. Cone, Reducing Residential Electrical Energy Use: Payments, Information and Feedback, *Journal of Applied Behavior Analysis, 10:*3, pp. 425-435, 1977.
6. R. A. Winett and M. T. Nietzel, Behavioral Ecology: Contingent Management of Consumer Energy Use, *American Journal of Community Psychology, 3:*2, pp. 123-133, 1975.
7. R. A. Winett, Prompting Turning-Out Lights in Unoccupied Rooms, *Journal of Environmental Systems,* in press.
8. M. Hersen and D. H. Barlow, *Single Case Experimental Designs: Strategies for Studying Behavior,* Pergamon Press, New York, 1976.
9. S. Siegel, *Nonparametric Statistics for the Behavioral Sciences,* McGraw-Hill Book Co., New York, 1956.
10. Environmental Design Human Factors Society, 1977.

Direct reprint requests to:

Paul D. Luyben
State University of New York
College at Cortland
Cortland, New York 13045