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ABSTRACT

The effects of a year-long newspaper series about energy on peoples' knowledge and actions were assessed in a Wisconsin study. The series consisted of 20 full-page newspaper articles, which appeared at intervals of from three to five weeks. Results, based on responses to a 16-item knowledge test mailed to newspaper subscribers and nonsubscribers before and after the series appeared, showed that newspaper subscribers increased their scores significantly from 1976 when the series began to 1977, that nonsubscribers did not increase their scores significantly, and that those who remembered reading at least one article from the series increased their scores by more than those who did not remember reading an article. Examination of specific test items showed that persons who both received the pretest questionnaire and saw the series of articles generally received the highest scores on the posttest, suggesting that questionnaire sensitization was a factor in the study. Scores both before and after the series were found to increase as educational level increased, and younger readers learned more from the series than older readers. No specific changes in respondents' energy-related actions could be linked directly to the reading of the series articles. (GW)

NEWSPAPER

EFFECTS OF A YEAR-LONG NEWSPAPER ENERGY SERIES ON READER KNOWLEDGE AND ACTION[1]

By

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Effects of a Year-long Newspaper Energy Series on Reader Knowledge and Action

Introduction

It is ironic that despite the tremendous volume of coverage of energy issues in this nation's newspapers and other mass media, the average citizen knows relatively little about where energy comes from, how it is used in the community, or what the prospects are for the future.

Following the Arab oil embargo of 1973, virtually every newspaper in the country increased its coverage of energy. Energy became to the mid-seventies what the environment had been to the late sixties. The New York Times increased its coverage of energy from 762 articles in 1972 to 3105 articles in 1973. Table 1 shows the dramatic increase in the Times' coverage.

TABLE 1

Energy-Related Articles Appearing in the New York Times, 1969-1976

YEAR	NO. OF ARTICLES
1969	888
1970	748
1971	774
1972	762
1973	3105
1974	5159
1975	3574
1976	1895
1977	1050 (first 6 months only)

Source: New York Times Data Bank.

Yet, after four years of intensive coverage and thousands of column inches, recent polls show that more than 40 per cent of Americans do not know this country imports oil (Gallup Poll, 1977). More than one-quarter think nuclear power plants could explode like an atomic bomb (Corporate Priorities; 1976).

Although most people think the energy situation is serious, most do not define it in terms of a genuine shortage of energy resources. Rather, as Table 2 shows, they define it in terms of price.

TABLE 2

General Public Definition of the Energy Problem

	1976 %	1977 %
High Price of Energy	63	65
Power of the Oil Companies	53	58
Dependence on Foreign Countries	53	48
Shortages in the Next Two Years	39	46
Shortages before the end of the Century	37	38

Source: Corporate Priorities, 1977 Yankelovich, Skelly and White, Inc., New York, N.Y.

The Study

This project was designed to bring newspaper readers a large volume of information about energy in the Madison, Wisconsin, area, and the state of Wisconsin over an extended period of time. The project attempted to answer several important questions about the effectiveness of newspapers in conveying information about topics such as energy.

Most studies of media effectiveness have concerned relatively simple messages disseminated and measured over a short period of time. (See, for example, Douglas, Dorothy F et al "An Information Campaign that Changed Community Attitudes," Journalism Quarterly 47:3 (1970) pp. 479-487. See also Salcedo, Rodolfo M. et al "A Successful Information Campaign on Pesticides," Journalism Quarterly 51:1 (1974) p. 91). We felt a newspaper's ability to impart more complex information over a long period of time needed to be tested.

One of the more important recent studies was one by Maccoby and Farquhar (1975) which used a media campaign eight months long to bring information on diet and risk of heart diaease to reaidents of two matched California communities.

Although the results showed that significant learning and even improvements in health of residents occurred (in the form of fewer cigarettes smoked and lower cholesterol levels), the study did not represent a pure test of media effects.

In addition to the TV, radio and newspaper coverage, each person sampled received direct mail reinforcements (booklets, heart health calendars, etc.), and one special high risk subsample met as classes or received individual instruction. Further, each person sampled appeared to be pre-tested---which raises questions about senaitization to media articles.

Thus, the question of what effect a series of articles alone would have over an extended period of time is not clear. The high cost of direct mail, personal contact, etc. makes this an important question.

Yarbrough (1971) used media as one of several communication tools to reach people with Civil Defense information. Results showed the media were effective in calling attention to the information, but few people took the time to read the information provided by the media or by direct mail.

A second important concern was whether or not such a series of newspaper articles would result in an increase in the knowledge gap between well-educated and poorly-educated readers. Tichenor (1973) explored the typical knowledge gap prediction that peraona with high education tend to learn more from media than those with lower education. They hypothesized that when citizens are aware that there are opposing views on a given issue, or that an issue contains "tension," they tend to read more about that matter regardless of educational level. That is, perception of conflict overcomes the usual knowledge gap effecta. They also found that locally-relevant iaauea created lesa of a knowledge gap than national isaues. A third finding was

that heavy media coverage (with repetition) leads to a closing of the knowledge gap at least for some locally-relevant issues for which there is a perception of conflict.

A newspaper was selected as the outlet for the energy series for several reasons. First, newspapers are the most important source named by respondents for local news. In a recent Ohio study, 40 per cent of respondents said newspapers were their most important source of local news, compared to 21 per cent naming radio and 19 per cent naming television. (Napier and Ross, 1975)

Newspapers are also a dominant source of information about science, an area closely related to energy. Wade and Schramm (1969) found 41 per cent of a national sample selected newspapers as their primary source of science information, compared to 28 per cent selecting magazines, 26 per cent TV, and 2 per cent radio.

Third, newspapers provide a large news hole permitting a fairly detailed discussion of important energy questions. TV and radio are much less well suited to in-depth coverage during regular newscasts. The public perceives newspapers as a source of complete information which "get below the surface of the news" and "tells the whole story." (ANPA Report, Vol. 6)

To deal with these questions, a year-long series of newspaper articles on energy was developed. Specific hypotheses to be tested included:

1)The series would improve newspaper readers' knowledge about Madison's energy situation and about energy in general. Knowledge was measured by a 16-item test given during the pre-test and the post-test. The test included energy questions relating to home uses of energy and to local and state energy questions. Some questions were specifically designed to test the respondent's conceptual understanding of how energy works.

2)Because of its local focus, because 80 per cent of Madison newspaper readers sampled said Madison's energy situation was very serious or somewhat serious, and

because energy alternatives (such as new nuclear power plants, a proposed city takeover of the local electric utility, etc.) had generated local conflict, it was hypothesized that the series would increase knowledge levels equally among all educational levels. Years of formal schooling was taken as the measure of educational attainment.

3)It was hypothesized that persons who read the series articles would take more steps to save energy in their homes than those who did not. Each respondent was shown a list of energy-saving steps they might have taken in the past year. Included were such items as adding insulation, taking fewer trips, using lights less, etc. Although the series did not focus exclusively on conservation, it was felt that this test would provide one indication of the effectiveness of series articles.

4)Because a pre-test was involved, the project also allowed a test of the effects of pre-testing compared to effects of getting the series articles only. Numerous past studies have suggested that pre-test sensitization may be as important as experimental treatments in bringing about effects. Thus, it was hypothesized that pre-test sensitization would affect rates of learning from the series.

One unique thing about the approach was in the preparation and planning of the articles. The series was developed by the Energy Information Project of the College of Engineering at the University of Wisconsin-Madison. A science writer from the College of Engineering was teamed up with a reporter from the Wisconsin State Journal. Together, the two planned the series approach and worked jointly to produce a series of more than 20 full page articles on energy. These appeared at intervals of from three to five weeks.

Thus, the series represented a rare cooperative venture between journalists and scientists---with articles being approved by both sides before being published.

The series was based in part on a survey of 1222 readers of the morning Wisconsin State Journal (circ: August, 1977 daily 74,975 Sunday 121,489) made in 1976.

The survey asked readers their opinions about Madison's energy future, and included the 16-item knowledge test. The survey thus served as a basis for writing the articles as well as a pre-test.

The 1976 mail questionnaire was sent to 1435 readers (including a control group of 200 persons who did not subscribe to the State Journal). The response rate for the pre-test exceeded 85 per cent. It exceeded 80 per cent for the post-test.

The research design was a modification of the Solomon Four-Group Design. (Campbell and Stanley, 1963). It has two controls, one for effects and one for questionnaire sensitization. The design is shown below:

Solomon Four-Group Design

Time One		Time Two
X(pre-test)	Series Treatment	X post test
X(pre-test)	Control	X post test
	Series treatment	X post test
	Control	X post test

A mail surveying approach was used in this study for budgetary reasons. Although we agree with Clarke and Kline (1974) that an open-ended approach to determining the knowledge level of respondents is best, it was decided that the mail approach would give at least a rough indication of knowledge effects. The mail approach also allowed questions about changes in attitudes, media behavior, and actual actions taken in response to the series to be considered.

Results: Changes in Reader Knowledge About Energy

During the year, all media in the Madison area covered the energy situation, although only the Wisconsin State Journal did it on a series basis. The State Journal itself used thousands of column inches on the energy situation in addition to what was in the series. This extensive coverage of energy made a pure test of series information difficult. However, since much of the series information was generated by the project itself, and since the series had as its goal bringing about a conceptual understanding of energy rather than a hard news orientation, it was felt that sufficient exclusive information existed in the series to make the knowledge test workable.

Mean scores from 1976 to 1977 on the 16-item knowledge test are shown for State Journal subscribers and non-subscribers in Table 3A.

Table 3A

Mean scores for subscribers and non-subscribers to the Wisconsin State Journal for 1976 and 1977. Table compares all persons pre-tested in 1976 to control group respondents in 1977 who were not pre-tested in 1976.

	Wis. State Journal Subscribers	Non-subscribers to State Journal	Overall Mean
Mean Score 1976 test	7.716	7.366	7.662
Mean Score 1977 test	8.262	7.570	8.016

An analysis of variance (Table 3B) for these two independent groups showed a significant increase (P less than .05) in mean scores for the subscribers to the State Journal from 1976 to 1977. For non-subscribers, the change in mean scores was not significant.

Thus, it would appear that the series had an effect on knowledge, although it represents less than half a point gain on a 16-item scale. A second explanation would be that it could have been other material in the State Journal (or another maturation effect) that brought about this change.

Table 3B

Analysis of Variance Comparing Scores for all Subscribers responding in 1976 with the non-pre-tested subscriber control group in 1977.

Mean Squares

	SS	DF	Mean Square
Total	13839.86	1274	
Treatment	58.92	1	58.92
Within	13780.94	1273	10.82

F=5.44 (R less than .05)

Analysis of Variance Comparing Scores for all Non-subscribers responding in 1976 with the non-pre-tested non-subscribers control group in 1977.

Mean Squares

	SS	DF	Mean Square
Total	3659.50	320	
Treatment	3.28	1	3.28
Within	3656.22	319	11.46

F= .28 (not significant)

It is important to note that the 1977 re-survey of the "non-subscriber" group disclosed that up to 20 percent of them said they did read at least one article in the series. The State Journal sells 8,000 copies per day on newsstands to non-subscribers. In addition, there were serious sampling difficulties in assembling a non-subscriber list (one person in a household might be a non-subscriber, while another might subscribe, thus bringing the paper into the home). These problems may result in a tendency to over-estimate the learning of non-subscribers.

A second comparison was made, for those who remembered seeing at least one of the series articles with those who either said they did not see an article or couldn't remember whether they did or not.

In order to compare series effects for those who remembered seeing at least one of the energy articles to those who did not, the following procedure was used. Only persons who responded both years (i.e. were

pre-tested in 1976 and post-tested in 1977) were used. Changes in scores for each person were measured by means of a two-way analysis of variance designed for repeated measures. The results showed that although both groups increased their scores, those who saw at least one of the articles improved their scores more (P=.0103). This is shown in Table 3C.

Table 3C

Two-way analysis of variance (designed for repeated measurement) comparing whether or not subjects saw an article with gains in knowledge from 1976 to 1977.

Mean Scores

	Saw Article	Did Not/Not Sure	Overall
1976 Scores	8.484	7.311	8.005
1977 Scores	9.336	7.752	8.690

Mean Squares

Mean Square	F ratio	Sig. Prob.	
862.18964	48.42	.000	Saw an article
220.15364	75.84	.000	Scores between groups
17.80812	--	--	Subjects within seeing article
19.17813	6.61	.0103	Seeing article interaction with scores change
2.90298	--	--	Subjects * Scores within seeing article

This test involved 939 respondents, 556 of whom remembered seeing at least one article, 252 of whom did not, 99 of whom were not sure whether they had seen an article or not, and 32 of whom did not answer the question.

An examination of the table shows that although a significant change did occur which seems to be attributable to the series; the overall relative increase in scores is small (about three-tenths of a point on a 16-item scale).

The analysis of variance showed that the change in scores from

1976 to 1977 was highly significant--an indication that people are learning more about energy problems (P less than .001). But it must also be remembered that all respondents in this group were sensitized to energy issues by receiving a pre-test. The analysis also showed that there was a significant difference between those who saw the stories and those who did not or who didn't remember at Time 1 (i.e. the groups were not equivalent in scoring in the beginning) (P less than .001).

Of more interest and importance is a comparison on changes in answers for certain key questions.

For those responding to the questionnaires both years, those who remembered seeing at least one story were more consistent in improving their score on each test item. Those who saw at least one article improved their percentage correct average by at least 1 per cent from 1976 to 1977 for 12 out of the 16 items. Two scores decreased by more than 1 per cent and two remained the same (See Table 4).

For those who did not see the stories, or who didn't remember whether they did or not, the percentage correct average increased on nine items, decreased on six, and stayed the same for one.

A general trend can be seen by examining some of the responses in more detail. One for which a large amount of learning took place was a question dealing with pilot lights on gas stoves. The question was "The pilot light on a gas range uses about what percentage of the range's total gas use?" Choices were 1%, 10%, 40% or not sure. Few respondents in any group got the correct answer (40%) in 1976.

Table 5 shows the relative improvement in scores for the group that saw at least one article.

The pilot light item was mentioned on four separate occasions in series articles, once in the lead, and once with a large illustration of a pilot light with the answer to the question under the picture. Results show that significant learning took place for this item (McNemar Test: P = less than .01) for those who saw at least one series article. Results for the group that did not see an article were not significant.

However, the important thing here seems to be that the group which

Table 4

Comparison of percent getting the correct answers on a 16-item knowledge test for those who remember seeing at least one article with those who did not or don't remember. The number following each question represents the number of times the particular question was discussed in the series.

	Saw an Article			Did Not or Don't Recall		
	% right in 1976	%right in 1977	Chahge	% right in 1976	% right in 1977	Change
1)If you turn down your heat at night during the winter, do you use more energy to warm the house in the morning than you save during the night (no) (2)	68.7%	70.5%	+	61.6%	57.6%	-
2)Do draperies help save energy when closed at night? (yes) (1)	95.3	97.3	+	91.9	92.4	NC
3)A gas range pilot light uses 1%, 10%, 40% or not sure of a range's total gas use (40%) (4)	3.1	16.4	+	2.4	5.0	+
4)Can respondent pick electric water heater as a higher energy user than an electric toothbrush. (3)	61.7	66.0	+	50.8	56.9	+
5)What is the cheapest energy in Madison today (natural gas from list) (4)	62.4	62.4	NC	59.5	55.4	-
6)How much does it cost to operate a color TV for one hour (2¢, 50¢, $1) (2¢) (3)	64.4	70.7	+	49.4	57.9	+
7)How much of Wisconsin's electricity comes from nuclear power plants (less than 1%, 8%, 35%, 75%) (35%) (4)	5.6	12.6	+	3.7	8.4	+
8)Do utilities store electricity in batteries for times of high energy demand (No) (2)	51.3	50.0	-	44.4	39.2	-
9)What determines how much electric generating capacity is needed in Wisconsin (air conditioning, heating units, or no one knows) (AC) (3)	49.4	53.6	+	42.7	44.7	+
10)Are electric rates regulated by the state (yes)(1)	81.5	81.7	NC	74.3	68.3	-
11)Can a nuclear power plant explode like a small atomic bomb? (no) (2)	57.7	53.6	-	43.6	42.0	-
12)Are solar water heaters commonly used in other countries? (yes) (1)	28.9	44.4	+	23.9	33.9	+
13)Will solar be most useful in 20 years for electricity, heat or transportation. (heat) (1)	61.5	74.5	+	55.4	62.9	+
14)Do we import more oil now than before the Arab oil boycott of 1973. (yes) (1)	55.2	65.5	+	43.1	54.1	+
15)What percentage of U.S. oil demand will the Alaska pipeline supply (less than 10%, 25%, 50% (less than 10%) (0, but was heavily covered in the general media)	54.4	61.7	+	38.9	52.7	+
16)Can an automobile engine be built which does not give off waste heat. (no) (0, but the concepts were discussed in several articles	49.8	52.9	+	45.9	44.1	-

Table 5.

Pilot Light: what percentage of the range's total use does the pilot light use?

	% selecting correct answer 1976	% selecting correct answer 1977	Change
Saw at least one article (pre-tested and post-tested)	-3%	17%	+14%
Saw at least one article (post-tested only)		7%	

Did not see an article (or don't remember) (pre-tested and post-tested)	3%	8%	+5%
Did not see an article (post-tested only)		9%	

McNemar Test: P less than .001 for group seeing story; P N.S. for group not seeing story.

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was both pre-tested and saw the stories increased its knowledge much more than did the group that received the articles only. This suggests that the receipt of the questionnaire itself, or the combination of the questionnaire and the series had an effect on rate of learning.

Table 6 shows results for another of the 16 questions---this one dealing with the percentage of Wisconsin's electric energy that comes from nuclear power.

This table supports the findings in the previous table only in part. Despite the fact that this item was also mentioned in at least four separate series stories, the differences between those who saw at least one article and those who didn't are less dramatic. For those who saw an article, the trend is the same as for the pilot light, with those pre-tested and post-tested showing greater learning. However, for the group that did not see an article, the control group percentage actually exceeded the sensitized group percentage.

Table 6

Percentage of respondetns in various treatments selecting the correct answer that Wisconsin gets approximately 35% of its electric energy from nuclear power plants.

	% selecting correct answer in 1976	% selecting correct answer in 1977	Change
Saw at least one article (pre-tested and post-tested)	6%	13%	+7%
Saw at least one article (post-tested only)		8%	
Did not see an article (or don't remember) (pre-tested and post-tested)	3%	9%	+6%
Did not see an article (post-tested only)		10%	

McNemar Test: P less than .001 for group seeing story; less than .01 for group not seeing the story.

Table 7

Is the United States importing More Oil, the same amount, or Less Oil now than before the Arab oil boycott of 1973?

	%selecting correct answer in 1976	% selecting correct answer in 1977	Change
Saw at least one article (pre-tested and post tested)	60%	74%	+14%
Saw at least one article (post-tested only)		62%	
Did not see an article (or don't remember) (pre-tested and post-tested)	55%	71%	+16%
Did not see an article (post-tested only)		67%	

McNemar test: P less than .001 for group seeing the story; P less than .01 for group not seeing the story.

A third question asked whether or not the United States was importing more oil, the same amount, or less oil now (1976-77) than before the Arab oil

boycott of 1973 (See Table 7). Results support the findings of the previous two tables. The groups that were both pre-tested and post-tested had the highest percentage correct, and the group that had seen at least one article had the highest overall percentage correct. In both cases, persons in the control group that was only post-tested did less well on knowledge. This supports the notion that for at least some items questionnaire sensitization was an important operating condition.

To fairly represent the findings, the question of whether or not a nuclear power plant can explode like a small atomic bomb was selected, since the percentage getting the correct answer declined from 1976 to 1977. As Table 8 shows, the pre-tested and post-tested group showed the smallest decline, while the control group had the fewest persons getting the correct answer. Did the series help slow down the national trend which has shown increasing fears about nuclear power? One article began with the statement that "There is no possibility that a nuclear power plant could explode like a small atomic bomb."

Table 8

Percentage of respondents who selected the correct answer that nuclear power plants can not explode like small atomic bombs.

	% selecting correct answer in 1976	% selecting correct answer in 1977	Change
Saw at least one article (pre-tested and post-tested)	58%	54%	-4%
Saw at least one article (post-tested only)		51%	
Did not see an article (or don't remember)(pre-tested and post-tested)	48%	45%	-3%
Did not see an article (post-tested only)		44%	

McNemar Test: No significant change for either group

Results suggest that the series itself played little role in this trend toward increased fears about nculear power. Although the group that saw the stories still had the largest percentage getting the correct answer in 1977, this group showed the largest decline in correct scores of any group.

Thus, overall, these tables suggest that for at least some questions the combination of getting the questionnaire and the series is having an effect on learning.

One methodological problem here is that the overall mean scores for the group which got the questionnaire and responded both years tend to be higher than mean scores for the post-tested only group. This is because those in the first group were asked to respond twice, and those in the post-test only group responded only once. Since there is a tendency for those who are low in energy knowledge or who are too ill or old to not answer questionnaires, the average mean scores of those who do answer gradually increases.

For example, the mean score of all Wisconsin State Journal subscribers in 1976 was 7.7, while the mean score of Wisconsin State Journal subscribers who also responded in 1977 was 8.0. Thus, the previous discussion may tend to <u>understate</u> the effects of the series alone, or to understate maturation effects associated with learning from other media about energy.

Effects of the Series on the Knowledge Gap

Table 9 shows that education had an effect on the likelihood of seeing a series article. The trend is for educated persons to be more likely to see an article, and the Chi-square relationship is significant (P less than .05). However, examination of the table shows that the results do not show a dramatic difference for education.

TABLE 9

Percent of those Who Saw One or More Articles or Didn't by Educational Level

Educational Level	Saw an article	Did not See/Don't Remember
Some grade school	1.1%	1.6%
Completed grade school	2.7	6.5
Some high school	3.4	6.0
Completed high school	21.6	25.6
Some college or higher ed.	26.4	25.1
Completed college	25.0	15.1
Advanced degree after college	18.7	16.5
	n=550	n=369

Table 10 shows the significant relationship that exists between level of education and improvement in score from 1976 to 1977. Because relatively few cases (fewer than five) are involved for the "some grade school" and "all grade school" groups, relationships shown there are not generalizable to that population. However, it is interesting to note that in those two groups the effects of more energy information (whether via the series or not) appear to be negative.

As educational level rises, scores both before and after the series also rise. In addition, the tables show a definite trend toward the predictions of the knowledge gap hypothesis. Thus, the hypothesis made for this project that the locally-relevant material about a topic for which there is a difference of opinion would lead to equal learning for all education groups was not supported.

Perhaps the conceptual nature of some of the questions was responsible for this effect. Instead of emphasizing controversial local questions such as "would a proposed nuclear power plant near the city be dangerous" or "should Madison buy the local privately owned utility," the series and questions were low-key. The series included controversial material, but in a broad context.

TABLE 10

Education and Scores for 1976 and 1977 for the 16-item knowledge test.

A. For Persons Who Remembered Seeing at Least One Series Article

	Mean 1976 Score	Mean 1977 Score	Change
Some grade school	8.00	5.80	-2.20
All grade school	7.53	9.06	+1.53
Some high school	7.15	7.52	+ .37
Completed high school	7.46	8.18	+ .72
Some college or higher ed.	8.06	9.02	+ .96
College degree	9.74	10.54	+ .80
Advanced degree	9.50	10.45	+ .95

B. For Persons Who Did Not See at Least One Series Article

	Mean 1976 Score	Mean 1977 Score	Change
Some grade school	4.00	1.00	-3.00
All grade school	4.93	5.40	+ .47
Some high school	5.25	6.66	+1.41
Completed high school	7.07	7.43	+ .36
Some college or higher ed.	7.67	8.12	+ .45
College degree	8.65	9.28	+ .63
Advanced degree	9.33	10.08	+ .75

One other socio-economic variable which appeared to have an effect on rates of learning from the series was age. As Table 11 shows, the youngest respondents learned the most from the series (even though the 41 to 64 year-old group was the most likely to read a series article). Older respondents--65 years of age or above--learned very little from the series.

TABLE 11

Effect of Age on Rate of learning from the Series Articles

Age	Change in Score for pre-tested and post-tested group from 1976 to 1977
20 to 40	+ .9
41 to 64	+ .7
65+	+ .1

Table 12 shows that there was little difference in learning for males versus females, an interesting finding because males outscored females by almost 33 percent on the 1976 test. Thus, while females did not fall farther behind males in their energy knowledge, they didn't catch up a great deal either. It is important to note that one full page of the series was especially designed for women readers, and interviewed prominent women in Madison about their energy views.

TABLE 12

Effect of sex on rate of learning from series articles

Sex	Change in Score for pre-tested and post-tested group from 1976 to 1977
Male	+ .7
Female	+ .8

Results: Effects of the Series on Energy-Related Actions

To attempt to get some measure of actions which might have been taken in response to the series, respondents were asked in 1977 if they had taken any of eight steps to save energy. The eight are:

1) turned off lights more or installed more efficient lighting;

2) turned down water heater temperature;

3) used air conditioning less;

4) installed better insulation or more of it;

5) installed weatherstripping or other energy-saving materials in your home;

6) took fewer trips or used vehicles less;

7) increased use of buses;

8) other (respondent was invited to specify this step)

Whether or not a specific action was taken because of reading an article in the series is difficult to establish. The first step is to determine whether or not any effects occurred. Did Wisconsin State Journal subscribers differ significantly from non-State Journal subscribers after a year of the series in terms of conservation actions? The answer is no. As Table 13 shows, the percentages taking conservation actions are about the same for the two groups (Chi-square=5.26 with 7 df).

However, when the group which recalled seeing at least one article is compared with the group that did not, the differences are significant at the .01 level ($X^2 = 24.5$ with 8 df; p less than .01). (See Table 14). In 1976, a similar set of questions was asked about conservation behavior before the series began. Examination of the relationship then showed that the two groups differed somewhat in their inclination to take energy conservation actions even before the series started, although the differences were not significant ($X^2 = 12.3$ with 8 df, n.s.).

Thus, the explanation for different conservation actions may go beyond the series.

Some series effects have been documented by means of letters or calls received inquiring about various energy questions. Many of these involved home energy problems--whether or not wind generators, wood-burning stoves, solar panels, or other products are economical, effective, etc. Responses to community

TABLE 13

Subscribers compared to non-subscribers to the Wisconsin State Journal for the number of conservation actions taken. Table shows the percentage giving each answer (1977 data).

Conservation steps taken	Wis. State Journal	Non-subscribers
None	7.0%	6.4%
One action taken	15.9	12.0
Two actions taken	26.2	26.4
Three actions taken	25.6	33.6
Four actions taken	16.2	16.0
Five actions taken	5.9	3.2
Six actions taken	2.0	1.6
Seven actions taken	.7	.8
	N=769	N=125

$X^2 = 5.26$ with 7 df (n.s.)

TABLE 14

Comparison of Conservation Actions Taken for Those Who Remember Seeing at Least One Energy Series Article Versus Those Who Do Not Remember Seeing at Least One Article. Table shows percentage giving each answer (1977 data).

Conservation steps taken	Remember seeing one article	Do not remember seeing an article
None	5.2%	8.8%
One action taken	13.6	18.5
Two actions taken	24.6	29.5
Three Actions taken	28.1	24.8
Four actions taken	17.9	13.1
Five actions taken	7.9	2.5
Six actions taken	2.9	.8
Seven actions taken	.1	1.6
	N=536	N=237

$X^2 = 24.5$ with 7 df (P less than .01)

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energy problem articles were received from utilities and others in energy fields. These scattered responses suggest that there were many diverse effects of the series, only a few of which might be apparent from the conservation questions asked.

In order to attempt to better explain who is taking actions to conserve energy, socio-economic variables were compared for the number of conservation actions taken.

Table 15 shows that education is weakly associated with taking more conservation actions. As level of education rises, there is a tendency for the number of actions taken to increase.

Age, sex, and income are other variables which might explain the number of actions taken.. Older respondents did not take as many conservation actions as younger ones did (many elderly respondents indicated they didn't think they would be around when energy ran out, and therefore they weren't especially concerned about it). (See Table 16)

There was virtually no difference for sex and number of actions taken (table not presented). Income had a definite effect. Table 17 shows that persons with higher incomes tended to take more conservation actions than those with lower incomes.

TABLE 15

Effect of Education on Conservation Actions Taken. Table shows percentage for each category.

	Number of actions taken							
Education	0	1	2	3	4	5	6	7
Below high school	8.5%	15.9%	27.6%	26.5%	14.8%	3.1%	3.1%	0 %
High school dip.	4.5	19.7	31.1	24.7	11.9	4.1	2.7	.9
Some college	7.0	14.8	23.4	26.7	19.3	5.7	2.4	0
College degree	5.0	13.7	27.9	28.4	15.7	7.1	1.0	1.0
Advanced degree	10.7	11.3	19.7	28.1	19.1	7.1	1.8	1.8

TABLE 16

Number of Conservation Actions Taken Compared for Age Group. Table shows percentage for each category.

	Number of actions taken							
Age group	0	1	2	3	4	5	6	7
20 to 40	5.9%	14.0%	24.5%	27.3%	18.1%	6.4%	1.6%	1.8%
41 to 64	6.7	15.2	25.7	27.8	16.2	5.4	2.5	0
65+	9.3	17.5	30.0	24.3	12.5	3.7	2.5	0

(Chi-square = 19.53 14 df. P=n.s.)

TABLE 17

Number of Conservation Actions Taken Compared for Income Level. Table shows percentage for each category.

	Number of actions taken							
Income level	0	1	2	3	4	5	6	7
Under $10,000	8.3%	18.6%	31.1%	22.7%	13.9%	2.7%	2.3%	0 %
$10,001 to $20,000	5.6	15.5	26.5	27.0	15.8	5.6	2.0	1.5
$20,001 to $30,000	5.9	13.0	21.2	28.2	18.4	9.7	2.7	.5
More than $30,000	9.3	11.4	17.7	33.3	20.8	5.2	2.1	0

(Chi-square = 31.89 21 df P= n.s.)

Conclusions

The question of how best to bring information to citizens is an extremely complex one. This study suggests that massive changes in knowledge levels cannot be brought about simply by utilization of a newspaper series alone--at least not using the broad general format used in this project. Increments in general knowledge levels appear to come in small amounts over extended periods of time, although awareness is much easier to achieve (66% of subscribers reported that they remembered at least one article of the series).

Questionnaire sensitization was common for s great many questions. While this necessitstes control groups to test pure media effects, it suggests that TV, radio or direct mail campaigns in conjunction with newspaper series may result in incressed effectiveness.

Still to be explained is why respondents learned significantly from some questions snd not others. Wss the illustrstion accompanying the pilot light facts sufficient to boost knowledge? Or was it in the nature of the information itself? This will be a subject for future research.

Another factor which might change future attempts to explain energy would be to control other sources of energy information coming into the paper. The inability to do so in the project--and the tendency for competing papers to pick up exclusive information--mske it difficult to control for maturation or outside effects durihg treatment periods.

Finally, an experiment which sought to emphasize conflict or controversial local aspects of energy would be well worth trying to further test the knowledge gap hypothesis. However, an important part of this should be to examine the extent to which accurate information is transferred. Bias could well be a result of deliberate emphasis on controversy.

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