

Energy Education for Children: A Preview of Programs, Problems and Possibilities

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*Upon this gifted age, in its dark hour,
Rains from the sky a meteoric shower
Of facts . . . they lie unquestioned, uncom-
bined.*

*Wisdom enough to leech us of our ill
Is daily spun; but there exists no loom
To weave it into fabric . . .*

Edna St. Vincent Millay

The dire nature of the energy situation has compelled many to search for solutions through methods of restraining energy consumption. Restraint in American society can be realized through modification of behavior or attitudes. In-

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dividual or corporate behavior can be restrained by various regulatory practices such as government imposed rationing (direct restraint) and tax policies (indirect restraint). Such efforts intend immediate changes in behavior and hope for eventual corresponding shifts in attitude. The second approach to restraint focuses on attitudes, and endeavors to change these through education. Appropriate behavioral modifications are expected to accompany or shortly follow attitude changes. While both approaches will ultimately be required to curb energy appetites in America and to safeguard energy consumption world wide, the remainder of this paper is concerned primarily with the latter option. Specifically, it addresses energy education for children.

Although adults rather than children are the major consumers and misusers of energy, the authors believe that children are of particular concern for three reasons. First, children's values and attitudes are generally malleable and are daily exposed to concentrations of formal and informal educational media and materials. Second, while children may not be able to drastically influence

energy-wasteful behaviors of their parents, children do have a significant potential impact on their own peer group. Third, today's children will be tomorrow's adults and decision makers.

Approach

Major obstacles inhibiting effective education for children are: (1) the availability of quality educational material and access to it; (2) viable methods of distributing materials and information to effect change; and (3) sound evaluation techniques that can demonstrate the effective impact of the educational information and curricula. As a preview, this paper provides information on the availability and access of energy education materials and programs that focus on children, discusses the key problems of change agents and evaluation, and identifies possible future directions for improving the field of energy education.

A fundamental assumption on which this approach rests is that the existing educational system (formal and informal) has the potential to effectively serve a society currently geared toward high-energy consumption. While questioning the assumption is legitimate, such inquiry is beyond the scope of present concerns.

Program Provisions and Their Providers

Educational materials come in many forms. Those to which people are exposed in their informal education include forms of advertising, television and radio programs, and examples of living set by others. These variations generally make no pretense about neutrality or impartiality of information dispensed. Formal education, which can take place in the schools or in groups such as 4-H and scouts, however, intends to present either a neutral perspective, or the many sides of an issue. The alleged objective is a truer, fuller understanding of reality.

Materials for formal energy education present a number of problems. First, many materials have been prepared by special interest groups such as

oil companies or utilities which are in the energy business for profit. Often the information they provide is biased or incorrect (Steinhart, 1974, p. 223). Second, energy, unlike chemistry, history, mathematics or economics is not a discipline. It is a field whose problems and understanding require contributions from all traditional disciplines, as well as from interdisciplinary approaches. Finally, energy education materials are competency oriented, and to date there is no evidence that their effectiveness has been adequately field-tested.

Responding to these concerns, Ernest L. Boyer, Commissioner of Education, has proposed the establishment of an Energy/Environment Action Center in the U.S. Office of Education to provide information and technical assistance to schools and colleges; to support the training of new energy and environment professionals; and to initiate the development of new curricula materials focused on the three "E's" of energy, environment and engagement (*Education, 1977, p. iii*). While realization of such an agency is yet to be determined, other organizations, both within government and among the research and educational hierarchy have begun generating new energy education curricula materials.

The following chart identifies several child oriented energy education curricula materials, their sponsors, developers, intent and availability.

While the programs and materials cited utilize diverse approaches and exhibit varied potential, they share a common need. In each instance, successful implementation hinges on capable and qualified teaching personnel, and upon necessary feedback from eventual evaluations.

Educating the Educators

While the production of energy education materials proliferates, training teachers appears to be progressing more slowly. Teachers are vital in the energy education process since they function as

Energy Education Materials For Young Children

Agency	Developer/Producer	Material	Description and/or Intent	Acquisition
	Federal Energy Administration Office of Public Affairs	<i>Energy Activities with Energy Ant</i>	A coloring—game booklet designed to teach children, K-3, about energy and how to use it wisely. 1975 (28 pages).	Limited copies available free. U.S. Department of Energy, Distribution, Office of Administration & Services, Washington, D. C. 20545.
	Federal Energy Administration Office of Public Affairs	<i>My Energy Book</i>	A reader that tells children, grades, 1-3, about energy and how to use it wisely. 1978 Rev. (28 pages).	Limited copies available free. U.S. Department of Energy, Distribution, Office of Administration & Services, Washington, D.C. 20545
	Federal Energy Administration Office of Public Affairs	<i>Energy Ant Film Strip Set</i>	Two-part color film strip with sound cassettes: "What is Energy?" (10 minutes) and "What is Energy Conservation?" (6 minutes) 1975.	U.S. Department of Energy, Technical Information Center, P.O. Box 60, Oak Ridge, Tennessee 37830. \$12.50 (make checks payable to: National Archives Trust Fund).
	National Science Teachers Association	<i>Energy Environment Materials for Teachers</i>	A multidisciplinary three volume study: A Teacher Resource Book, annotated bibliography and guide for the development of mini-units. 1975.	National Science Teachers Assn. 1742 Connecticut Ave., N.W. Washington, D.C. 20009.
	Energy & Man's Environment, Inc. Revision of Univ. of Houston, Energy Institute	<i>Energy Education Materials Inventory</i>	A six-part materials survey of over 4000 items of printed matter, films, kits and games currently being updated and revised. 1976—	Not yet available.
	Federal Energy Administration Office of Public Affairs	<i>The Energy Challenge</i>	An interdisciplinary unit designed for grades 5-8, that focusses on energy's history, present and future. Contains 24 spirit duplicating masters. 1976 (36 pages).	Single copies available free. The Energy Challenge Box 14306 Dayton, Ohio 45414.
ERDA	National Science Teachers Association	<i>Interdisciplinary Student/Teacher Materials in Energy, the Environment and the Economy</i>	A series of curriculum guides three of which were specifically designed for small children: <i>The Energy We Use</i> (Grade 1) 1977, 41 pages, <i>Community Workers and the Energy They Use</i> (Grade 2) 1977, 80 pages and <i>Energy and Transportation</i> (Grade 3) 1978, 89 pgs.	Limited copies available free. U.S. Department of Energy Technical Information Center P.O. Box 60 Oak Ridge, Tennessee 37830.
	Oak Ridge Associated Universities	<i>Science Activities in Energy Series</i>	A set of four experiment packets designed to illustrate principles and problems related to the various forms of energy; Electrical Energy, Chemical Energy, Solar Energy, and Conservation.	Limited copies available free. Am. Museum of Atomic Energy Oak Ridge Associated Univ. P.O. Box 117 Oak Ridge, Tennessee 37830

Energy Education Materials For Young Children *Cont.*

Sponsor Developer/Producer	Material	Description and/or intent	Acquisition
University of Tennessee- see Environment Center	<i>Energy Conservation in the Home</i>	A secondary home economics curriculum guide which is interdisciplinary in nature and easily adaptable to primary grades. It includes 26 student activities. 1977. (335 pages).	Limited copies available free. U.S. Department of Energy Technical Information Center P.O. Box 60 Oak Ridge, Tennessee 37830
Energy & Man's Environment, Inc.	EME Materials	Energy Resource documents for teachers: Film Index, Glossary, Annotated Bibliography, Activity Guide and Lesson Plans.	Energy & Man's Environment 1224 S.W. Hamilton St. Skyline Bldg., Suite 301 Portland, Oregon 97201.
University of Tennessee- see Environment Center	Four Seasons Posters	(4) 24 x 36 inch posters to be colored by young children depicting seasonal energy conservation opportunities.	Available free in sets of four University of Tennessee Environment Center 330 S. Stadium Hall University of Tennessee Knoxville, Tennessee 37816

agents of change. Again the question of their effectiveness is basic and largely unanswered. In 1973, the Rand Corporation was contracted to evaluate the results of four U.S. Office of Education "change agent" programs. In general, the programs were designed to improve students' achievement and attitudes, prepare them for careers, and correct inequities experienced by minority groups. Results over the last decade had been disappointing. For this study, Rand researchers calibrated success in terms of five criteria: the percentage of goals achieved; the type and amount of change in teaching practices; improvement in student achievement and attitudes; the extent to which teachers incorporated and continued to use project methods and materials; and the extent to which the district incorporated the project into its regular program and supported it with its own funds after federal seed money ran out. In light of the research, the Rand team concluded that the way in which a project is carried out is more important than the educational technique introduced, the amount of funding, or the size of the project. Based on this finding, it appears that the preparation of teachers and faculty as well as their participation in decisions concerning project planning and implementation should be of paramount importance in efforts to increase the effectiveness of energy education.

Most of the materials development projects mentioned above sought teacher input during their formative evaluation/field-test phase. However, the actual training of teachers in the area of energy education has been limited. The Department of Energy does provide funds for a few faculty development projects, and several states have held teacher inservices, short courses, and workshops with money provided through Title I of the Higher Education Act.

Evaluation and Feedback

Baseline data for the development of energy conservation educational materials, programs and processes is practically nonexistent. Data is needed to determine the attitudes of youths and "change agents" toward energy conservation, the cognition level of youths and "change agents" in regard to energy, the effectiveness of the delivery mechanism, and the compliance, over time, to energy conservation measures. Traditionally educational materials have been evaluated subjectively by teachers, curriculum developers and occasionally by students. However, few attempts have been made to empirically evaluate materials or programs. A systematic, reproducible and generalizable evaluation methodology is needed. In the area of energy, attitudinal surveys have

been conducted; however, the vast majority have been geared toward the adult population. Surveys of youths are needed to detect attitudinal barriers which may exist regarding their role in conserving energy. In addition, the level of existing knowledge needs to be determined. Once the knowledge base has been determined, effective materials can be developed. The effectiveness of the delivery mechanism is an extremely germane question. In an era when the mass media have claimed such a large portion of youths time, research is needed to determine its effectiveness in delivering energy conservation information. The teacher may not be the most effective "change agent" in this case.

As has been implied by the term "change agent," the goal of energy conservation education is to bring about change: changes in the attitudinal values and behaviors of the recipient. There is a need to determine what energy conservation measures currently serve as a baseline. Only then can energy educational program effectiveness for increasing compliance to energy conservation measures be determined, thus providing a viable "yardstick" for an energy education program. Compliance to a recommended measure is a relatively new area of concern to educators. And as such, little research has been done in this area. However, the evaluation measures required by the new Energy Extension Service Program, the Energy Policy and Conservation Act and the Energy Conservation and Production Acts include compliance to recommended energy conservation measures. It is in this way that educational programs can be tied to actual energy savings. This is also an important step in answering the vital question of "how does the program cost compare with actual economic savings?" These evaluative concerns will be further explored in a future paper.

Possible and Likely Futures

Elizabeth Dodson Gray, co-director of the Bolton Institute, a prominent energy research

center, maintains that future energy education should be holistic in nature, realistic in content, and oriented toward "empowering students to make rational choices about their lives and futures" (*Education, 1977, p. vii*). The future of energy education, and its role in effectively reducing our national energy consumption voluntarily, will be largely dependent on:

- 1) The development and availability of accurate, effective materials;
- 2) The evaluation and subsequent incorporation of the findings;
- 3) "Change Agent" training and involvement in the development of programs.

Funds have been made available on both the national and state levels to accomplish these goals. In addition to the projects mentioned above, the Energy Policy and Conservation Act (Pub. L. 94-163) and the Energy Conservation and Production Act (Pub. L. 94-385) provide funds to all the states to develop comprehensive state energy conservation plans. A number of programs are mandatory under these acts such as "right-turn-on-red" laws, improved state procurement practices, and thermal and lighting standards for public buildings. Though "educational programs" are not required, funds are available for optional programs which can be educational. Each state will determine its own stance in this area.

In addition, the U. S. Department of Energy has been charged by Congress to create an Energy Extension Service modeled after the U.S. Department of Agriculture's Cooperative Extension Service. Presently, ten pilot states have been selected to develop, implement and evaluate Energy Extension Service programs. These pilot programs emphasize the use of existing delivery mechanisms and the development and dissemination of energy conservation materials. Although this is now a pilot project, all 50 states will be included in the Energy Extension Service by 1980.

Because of critical energy circumstances, energy decisions should be based on the soundest

information available. A basis for rational energy judgment according to James D. Bishop, Jr., assistant to James Schlesinger, is found in education which "offers the best window to the future by developing the kinds of tools we'll need to manage the future. For if we don't, the future will be far different and more chaotic than anything that you or I would dare to imagine" (*Education*, 1977, p. vi). A minimal starting point is effective energy education for children.

Note

1. On October 1, 1977 REA and ERDA functions were transferred to the U. S. Dept. of Energy.

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