1-1-1986

Know nukes : a model for teaching controversial issues.

Mitchell S. Thomashow
University of Massachusetts Amherst

KNOW NUKES: A MODEL FOR TEACHING CONTROVERSIAL ISSUES

A Dissertation Presented

By

MITCHELL S. THOMASHOW

Submitted to the Graduate School of the
University of Massachusetts in partial fulfillment
of the requirements for the degree of

DOCTOR OF EDUCATION

February 1986

Education

KNOW NUKES: A MODEL FOR TEACHING CONTROVERSIAL ISSUES

A Dissertation Presented

By

MITCHELL THOMASHOW

Approved as to style and content by:

Robert Miltz, Chairperson

Peter H. Wagschal, Member

Thomas H. Stevens, Member

Mario Fantini, Dean
School of Education

DEDICATION

This dissertation was written in the spirit of progressive, risk-taking, and meaningful education. It is dedicated to my various teachers, at all levels of schooling, who have supported such an approach.

ACKNOWLEDGEMENTS

Prof. David Sobel of Antioch/New England has been a most valuable colleague/friend/co-director. David's imagination, creativity, and rigor have served to consistently open my eyes to new educational directions. Dean Lewis Feldstein (Antioch/New England) has provided me with the support to pursue interesting projects and to take meaningful risks. His vision and leadership allow projects such as KNOW NUKES to thrive.

My committee (Professors Robert Miltz, Peter Wagschal, and Tom Stevens) were ideal. They allowed me the independence, trust and autonomy I needed and they provided excellent advice when I asked for it.

Other people who deserve mention include:

- Prof. Tyree Minton (Antioch/New England) whose friendship and professional advice allowed me to complete the dissertation.
- Prof. Fred Weinstein (State University of New York at Stony Brook) who taught me how to approach social theory, ideology, and history.
- Bob Kahn (Robert D. Kahn and Associates) who encouraged and listened.
- Cindy Thomashow (my wife) who supported, encouraged and listened. Cindy was always there when I needed her.

ABSTRACT

KNOW NUKES: A MODEL FOR TEACHING CONTROVERSIAL ISSUES

FEBRUARY, 1986

Mitchell S. Thomashow, B.A. New York University

M.A., State University of New York at Stony Brook

M.S.T., Antioch/New England Graduate School

Ed.D., University of Massachusetts

Directed by: Professor Robert Miltz

This dissertation articulates elements of an educational strategy which has been derived from the experience of the KNOW NUKES program, a teacher training project designed to introduce the nuclear power controversy in the high school classroom. This strategy can be used a means of furthering the effectiveness of controversial issues education, not only in the area of nuclear power, but in teaching about any environmental issue.

This will be specifically achieved by (1) placing the KNOW NUKES institute in the broader context of controversial issues education; (2) describing in detail KNOW NUKES project planning; (3) reviewing the structure and content of the various teaching techniques and materials that have been developed for the KNOW NUKES institute; (4) utilizing a particular technique developed by the institute that reveals varying perspectives on controversial issues, in this case,

an instrument for decoding the controversial issues that are explicit and implicit in corporate image advertisements; (5) qualitatively evaluating the practical implementation of the KNOW NUKES model.

TABLE OF CONTENTS

LIST OF TABLES

C H A P T E R I

INTRODUCTION: THE NUCLEAR POWER CONTROVERSY AND PUBLIC EDUCATION

Rationale and Purpose

Despite the recent economic moratorium on the construction of new nuclear power plants in the United States, private and public research into nuclear energy development, and international nuclear power plant construction continues unabated. Thus public debate about this controversial energy source will remain an important global issue for years to come.

The nuclear power controversy represents one of the most complex and provocative dilemmas that affects the future of world energy planning. For some people, nuclear power is a safe, prolific energy source that will supply international energy needs well into the twenty-first century. The belief is that nuclear power can help the world maintain a stable growth economy and provide the foundation for an energy rich, affluent society. For others, the risks and uncertainties of nuclear power are sufficiently severe to pose the most dangerous health risk of any technology ever used by humans and this risk warrants the eventual abandonment of nuclear power. Many other people have a

position somewhere in between these extremes. The nuclear power debate has become stereotyped around these polar positions and typically the controversy includes propaganda and bias that obscure the seminal issues.

The nuclear power issue continues to receive widespread media attention, but there have been very few efforts to develop education programs that have been oriented towards the development of curriculum, teacher training programs, or community workshops that specifically address the skills and techniques for teaching about the controversy. Numerous utilities, corporations, anti-nuclear groups, and energy educators have developed reams of materials that teach about nuclear power. Yet most of these efforts are rendered inadequate because of the dual agendas of these groups, i.e., education and advocacy.

Although significant attention has been placed in the areas of conflict resolution, values education, and moral reasoning, and certainly these topics comprise an important aspect of controversial issues teaching, there is a widespread absence of controversial issues training programs. Many educators lack the techniques for introducing controversy in the classroom.

Antioch/New England Graduate School in Keene, New Hampshire organized the KNOW NUKES Institute in 1981, based

on the widely held assumption among New England's energy educators that an important vacuum existed in nuclear power education. There was no systematic attempt to develop an approach to teacher training that enabled participants to learn both the technical aspects of nuclear power and methodologies for introducing the nuclear power controversy.

The institute was founded on the belief that important national controversial issues must be taught in the nation's classrooms as a means to facilitate scientific literacy, critical thinking, and citizen action. Yet teachers and students commonly shy away from these issues because they are overwhelmed by the difficult technical material or because they are unwilling or do not have the support to bring controversy into the classroom. The primary goal of the KNOW NUKES Institute is to train teachers and community educators to introduce the nuclear power controversy into diverse educational environments.

This dissertation articulates elements of an educational strategy which has been derived from the experience of the KNOW NUKES program. This strategy can be used a means of furthering the effectiveness of controversial issues education, not only in the area of nuclear power, but in teaching about any environmental issue.

This will be specifically achieved by (1) placing the KNOW NUKES institute in the broader context of controversial

issues education; (2) describing in detail KNOW NUKES project planning; (3) reviewing the structure and content of the various teaching techniques and materials that have been developed for the KNOW NUKES institute; (4) utilizing a particular technique developed by the institute that reveals varying perspectives on controversial issues, in this case, an instrument for decoding the controversial issues that are explicit and implicit in corporate image advertisements; (5) qualitatively evaluating the practical implementation of the KNOW NUKES model.

Methodological Approach

The methodological foundation for the study builds on the five step sequence delineated above. First is a discussion of the historical context of controversial issues education, defined here as an educational process designed to help individuals understand the content, the different perspectives, and the moral dilemmas that are intrinsic to scientific, philosophical, political, and social issues that impact society. In Chapter 2, this definition is elaborated and contrasted with the seminal literature. This literature review includes a brief history of the various attempts to discuss controversial issues education as an academic theme, a summary of recent controversial issues teacher training programs, and a review of nuclear power education programs.

The primary methodological purpose of this overview is to establish criteria for effective controversial issues education. These criteria will become the basis for evaluating and reviewing the KNOW NUKES model. Chapter 3, The Conceptual Foundations of Controversial Issues describes a working philosophy of controversial issues education (CIE), by explaining how CIE integrates theory and practice in several broad areas: participatory policy, educational psychology, and school/community relations. This chapter describes the conceptual rationale behind the KNOW NUKES strategy by developing the seminal objectives which inform KNOW NUKES educational practice. These objectives are listed below because they represent the educational assumptions that ground this dissertation.

(1) Learners must be able to identify, describe, and analyze the various perspectives that comprise a controversy.

(2) Learners must separate bias and propaganda from factual information whenever possible.

(3) Learners must acquire an acceptable technical competence in controversial issues so they can critically evaluate diverse interpretations of the content.

(4) Learners must be exposed to opposing points of view which will generate a cognitive disequilibrium facilitating problem solving, creativity, the ability to overcome stereotypes, and the ability to accept meaningful compromise.

(5) Learners must identify the psychological motivations (norms, standards, values, criteria) that contribute to decision-making about controversial issues.

(6) Learners must be able to develop/facilitate a community of controversy that values heterogeneity and establishes shared learning goals and objectives.

(7) Learners must adhere to communication rules that emphasize effective group process, that are supportive of diverse perspectives, and that promote constructive controversy.

(8) Effective controversial issues education encourages learners to actively utilize community resources.

The KNOW NUKES institute is unique in its attempt to develop a model planning process and innovative teaching techniques. A primary objective of this dissertation is to describe the educational programs that have been developed as a result of the institute and to review those programs within the broader context of controversial issues education. The second step of the methodological sequence involves a comprehensive review of the planning process that has emerged from the institute. Chapter 4, The KNOW NUKES Institute: A Case Study in Controversial Issues Education reviews the brainstorming origins of KNOW NUKES, its funding sources, the planning process, the project design, the program description, and the project impact.

An important component of the institute is the establishment of a community of controversy, an environment that allows diverse interests to openly express their points of view. This notion was the guiding principle behind much of the planning process and teacher training. Community of controversy refers to those individuals and interest groups

that are key participants in the discourse surrounding a controversial issue. "Community" implies that the participants establish communication rules that enable them to openly express their points of view and be willing to consider multiple and varying perspectives. Chapter 4 describes the KNOW NUKES strategy for cultivating an appropriate community of controversy.

The KNOW NUKES program developed numerous teaching techniques and curriculum ideas that have been published, pilot tested and the subject of informal teaching experiments. The third step in the methodological sequence is a comprehensive description of these techniques. Chapter 5, The KNOW NUKES Institute: Teaching Techniques for Controversial Issues Education reviews these techniques in detail. The criteria for the review are the CIE objectives listed above.

A difficult problem for any controversial issues program is to develop appropriate materials and techniques that allow learners to clearly articulate the basic elements (values and content) of a controversy. The KNOW NUKES institute developed a particular teaching technique that serves as a first step in the identification of controversy. This technique serves as a measuring instrument which reveals how different interest groups identify controversy in issues advertisements. It also trains users to identify

and critique controversial issues which are explicitly or implicitly represented in the text of issues advertisements. It accomplishes this, in part, by revealing to the user his/her interpretation of controversial content. The fourth step in the methodological sequence of this dissertation involves experimenting with this technique to determine how different user groups identify controversial content. Chapter 6, The Ads Technique Research Design discusses advertisements and controversial issues, the educational design of the ads technique, and the methodological parameters of the actual experiment. Chapter 7, The Ads Technique Experiment: The Interpretation of Controversy describes the results of the experiment and includes a discussion of how the ads technique can be modified for further use.

A second primary objective of this dissertation is to place the KNOW NUKES institute in a broader educational context by determining its impact as a public education program. The fifth step in the methodological sequence is to retrospectively and qualitatively review the KNOW NUKES idea. Chapter 8, Does Controversial Issues Education Have a Future? considers the practical implementation of CIE.

Significance of the Study

The KNOW NUKES training model has attempted to achieve several objectives that are unique to nuclear power

education, most importantly to combine rigorous technical knowledge about a contemporary environmental issue with an understanding of the intricacies of the controversy surrounding that issue. This training model is described in depth so that others can review the various approaches, methods, and strategies involved, thus enabling the institute to be (1) reviewed in a broader context (2) considered for its wider application. What specific implementation problems and potentials emerge from this study? Does the KNOW NUKES educational strategy hold promise as a public education approach for other environmental issues? What curriculum techniques can be adapted for other issues?

Secondly, this study helps to revitalize controversial issues education as a legitimate, effective educational process. This is accomplished by demonstrating the integration of theory and practice. A philosophical and conceptual rationale for CIE is established, but more importantly, the rationale becomes the basis of a practical application. This study reaffirms, by studying KNOW NUKES in detail and documenting its approach, that public and private support for progressive, innovative educational ideas is possible.

Methodological Limitations

An important methodological question concerns how one measures the impact of a project such as KNOW NUKES. Do you set up an elaborate battery of pre and post tests? Do you concentrate on its impact in the classroom? Do you look carefully at specific teaching techniques? Do you measure participant attitude change?

The author has determined that a rigorous, quantitative evaluation of KNOW NUKES involves too many unknowns, too much imprecise data, and would cover too many issues. Moreover, a general review of the project, placing it in a broader educational context, would better serve the needs of the education community because it will provide tangible examples of a range of phenomena (planning process, teaching techniques, etc.). Therefore KNOW NUKES is described using the participant-observation method and placed within the framework of controversial issues education generally and nuclear power education specifically.

The risk is that "participant-observation" becomes a catch-all for an informal qualitative review that prevents any certainty in determining the project's impact. This dissertation will not find out whether KNOW NUKES really has impact in the classroom, because the entire project is not quantitatively evaluated. Moreover, the author as KNOW NUKES

project co-director is bound to have particular biases that will interfere with his description of the project.

The author's bias should be clear from the outset. Controversial issues education is a vital, progressive and innovative approach to contemporary issues that facilitates critical thinking, public awareness, and scientific and technical literacy. This bias doesn't necessarily interfere with the main objectives of this study. The purpose of the dissertation is to document KNOW NUKES so other educators have a record of its theory and practice. In fact, learning how to deal with bias is an important element of CIE. Teachers inevitably bring opinions with them into the classroom. KNOW NUKES participants have biases about nuclear power. Revealing bias is a difficult issue for the educator (see Chapter 4), but confronting one's bias can strengthen a study, because the author is less inclined to have it emerge unconsciously or within a supposedly unbiased framework.

The participant-observation method allows for creative insight, and it preserves the sanctity of personal experience. Notwithstanding the problems mentioned above, it should serve well for this dissertation.

CHAPTER II

LITERATURE REVIEW: KNOW NUKES WITHIN THE CONTEXT OF CONTROVERSIAL ISSUES EDUCATION

The purpose of this literature search is to place KNOW NUKES within the broader context of controversial issues education. Therefore the narrative follows a sequence which outlines (1) important watersheds in controversial issues education; (2) significant teacher training programs; (3) educational materials and programs about the nuclear power controversy; and (4) teaching techniques for decoding issues advertisements.

Conceptual Foundations

Teaching controversy represents a special challenge for educators. Few school systems or communities encourage controversial subject matter in the classroom, especially when the material deals with questions of morality. Hence teachers must be well prepared to defend their approach. The educator must determine whether he/she will introduce controversial issues in the classroom and then plan specific methodologies for teaching those issues effectively. Consequently there is debate regarding the philosophy, implementation, and general value of introducing controversy

in the classroom. Controversial issues education is itself controversial.

Several questions of relevance to the controversial issues educator consistently emerge. These are outlined by James P. Shaver (1971) in the Encyclopedia of Education:

(1) Intellectual Skills - What intellectual skills must students learn if their decisions about issues are to be intelligent and rational?

(2) Controversy and the Community - What is the role of the community in determining how schools deal with controversial subject matter?

(3) Teaching Techniques - What is the appropriate balance of process and content in teaching about controversial issues?

Most discussions of the virtues of controversial issues education cite the importance of developing critical thinking skills. John Dewey's five step guide to effective problem solving as described in How We Think: A Restatement of the Relation of Reflective Thinking to the Educative Process (1933) became a conceptual foundation for the observational approach to problem solving. Dewey's five steps are (1) the anticipation of possible solutions; (2) the careful definition of the problem; (3) the use of the possible solutions as hypotheses to guide the collection of data; (4) the elaboration of ideas; and (5) testing hypotheses through action.

Several approaches to citizenship education and critical thinking were based on Dewey's approach. These are

summarized by Muessig (1975) who provides a brief historical review of the role of controversial issues in American education.

An important watershed in controversial issues education and critical thinking methodology resulted from the work done by Donald W. Oliver, James P. Shaver, and Fred W. Newmann who emphasized that controversial issues could not be effectively studied without emphasizing the ethical and moral implications of the subject matter. That is, individuals must clarify their values as a basis fordecision-making, and that an important intellectual skill for controversial issues education is the ability to recognize and choose between value differences. This, in fact, became an important intellectual foundation of the values education and humanistic education movements of the late 1960's and 1970's.

Oliver and Shaver's book Teaching Public Issues in the High School (1966) is the first systematic attempt to describe the values analysis approach to controversy. Their chapter "Selected Analytic Concepts for the Clarification of Public Issues" analyzes three types of potential disagreement and suggests strategies for their resolution. They cover the resolution of definitional agreements; ideological or value-laden class names in political controversy; the emotional components of words, value problems, values and decisions; the importance of reflective

analysis; determining the reliability of factual claims; and evaluation of the appropriateness of various sources of evidence. Thus Oliver and Shaver emphasize the integration of critical thinking, observation, and values analysis and in so doing they provide a theoretical foundation, methodological approaches, and research results that are the basis of much of the controversial issues education field for the next decade.

Newmann's text, Clarifying Public Controversy: An Approach to Social Studies (1970) is an elaborate amplification of the Oliver and Shaver material. Seeking to "describe an approach to the discussion of public issues and to provide an analytic framework and a series of substantive concepts useful for implementing the approach in the classroom, legislature, living room, or coffee house," (p. 1) Newmann's text remains the most comprehensive approach to controversial issues education currently available. He provides numerous examples of types of discussions that might emerge in controversial issues discourse, emphasizing the relevance of values analysis and the importance of separating fact and value. He provides guidelines for teaching appropriate discussion skills and emphasizes the importance of community involvement in public education. Newmann incorporates extensive coverage of concepts such as morality-responsibility, equality, welfare-security,

consent, and property, thus firmly rooting the book in the political and educational environment of its time.

David W. Johnson and Frank P. Johnson in Joining Together: Group Theory and Group Skills (1982) place controversial issues education within the context of group dynamics and cooperative learning. Their text covers leadership, decision-making, group communication, conflicts of interest, the use of power, leading discussion groups, problem solving, and team building which are all applicable to effective teaching about controversial issues. Their chapter "Controversy and Creativity" emphasizes the relationship between participation, involvement, controversy, and creative problem solving. They assume that the constructive management of controversy within a group requires that members share a common set of values and beliefs about controversy, therefore they delineate numerous exercises stressing norms and rules and values analysis. Additionally their classification of constructive and destructive controversy, and the numerous exercises on creativity, problem-solving, brainstorming, and open-mindedness offer the practitioner an invaluable sequence of applied methodologies.

Thus controversial issues education is linked to cooperative learning. In "Conflict in the Classroom: Controversy and Learning" (Review of Educational Research, 1979) David W. Johnson and Roger T. Johnson summarize the

research linking cognitive perspective taking and the use of controversy. Citing the assumptions of cognitive development theorists Flavell, Kohlberg. and Piaget who posit that "it is repeated interpersonal controversies, arguments, and disagreements (in which the person is forced again and again to take cognizance of the perspective of others) that promote cognitive and moral development, the ability to think logically, and the reduction of egocentric reasoning" (p. 54) they describe how creating disequilibrium "within a person's cognitive structures" motivates mature reasoning. However, they are careful to distinguish between different contexts of controversy and they list the ways in which a cooperative context must be established. This includes the importance of establishing supportive, open, and cooperative learning environments. The Johnsons assert that controversies are managed most effectively when participants develop what they call perspective-taking skills, "the ability to understand how a problem or situation appears cognitively and affectively to another person (p. 60)." This article has numerous citations regarding the relationship between controversy, cooperative learning and skill development.

There have been numerous discussions emphasizing the value and relevance of controversial issues education. Massialas (1975) contends that controversial issues education should be at the very heart of schooling. He

believes that the school accomplishes its raison d'etre when it helps students and teachers challenge established institutions, create new ideas, and seek viable alternatives for the society in which we live.

Esposito (1969), Laguna (1972), Goldstein (1980), and Kelly and Gross (1981) provide guidelines for discretely introducing controversial issues in the public school curriculum. Goldstein suggests that schools establish well thought out policies regarding the introduction of controversial content so they can defend their approach to the general community. Schug (1984) lists several resources which address the types of objections frequently raised about controversial materials and which suggest ideas regarding school policy, legal considerations, and academic freedom.

Johnson, Johnson, and Johnson (1976) establish guidelines for how to teach controversial issues in the classroom. They emphasize that students must be assigned to heterogeneous learning groups; confronted with contrasting viewpoints and contradictions; learn the attitudes, skills, and strategies for constructively managing interpersonal conflicts; understand the importance of cooperative learning tasks; and recognize the importance of rational argument, proof, logic, and inquiry as the basis for the effective gathering and organization of information.

Controversial Issues Teacher Training Programs

Two teacher training programs were derived from the work of Oliver, Shaver, and Newmann. The Far West Lab for Educational Research and Development (1973) initiated a project designed as a skill training program for high school students and teachers "with an overall objective of developing student and teacher skill in discussing controversial issue effectively." Using criteria derived from Oliver and Shaver's programs the project delineated thirteen moderator techniques and thirteen participant techniques that would be learned as a result of four short seminars. The project directors (Lai, M.K., Gall, M.D., Elder, R.A. and Weathersby, R., 1973) report that the project demonstrated an improvement in the use of discussion techniques among those who took the course.

The Panhandle Area Education Cooperative (Chipley, Florida) received a National Institute for Education grant in 1974 to train preservice and in-service teachers interested in using public controversy and public issues as part of their curriculum. Through participation in an eight week course and use of a programmed, modular handbook and videotapes, teachers were expected to better understand the description of public controversy and policy issues, the description of ethical analysis, strategies by which such issues could be challenged or decided, facilitation of

discussion, and the development of an instructional sequence involving public controversy. Their project is described in a National Institute of Education (1979) report.

Nuclear Power Education

The field of nuclear power education has been barely touched by the controversial issues approach. Although several articles have stressed the importance of teaching about nuclear power from this perspective, KNOW NUKES remains the only teacher training program in this area. This can be attributed to the strong advocacy positions that have typically been taken by both utility educators and anti-nuclear activists. The urgency of their advocacy tasks has preempted the constructive controversy approach.

Capelluzzo (1979), Shillenn and Vincenti (1981), and Armstrong (1982) have advocated the integration of controversial issues education and nuclear power education. Cappelluzzo urges curriculum developers to clarify, educate, and sensitize their students to nuclear concerns. Shillenn and Vincenti emphasize the importance of including informational content from contrasting perspectives and explain that science must become more social studies oriented. Armstrong discusses the relevance of nuclear power issues for environmental educators. But nuclear power curriculum and teacher training have been primarily restricted to straight technical information or outright

advocacy. Prior to KNOW NUKES there were only two programs designed to incorporate an issues approach.

The Department of Education funded the Intermountain Science Center (Idaho Falls, Idaho) project Citizen Education on Nuclear Technology. The most significant project outcome was an interdisciplinary curriculum guide which covered the technical aspects of nuclear power production, the role of political power in nuclear issues, and a risk-benefit approach to energy resources. Designed for high school courses and adult education, the curriculum included a decision making module for use in continuing community action. This teaching guide was among the first balanced approaches to nuclear issues education.

With United States Department of Energy (1981) support, Sweet Briar College in Sweet Briar, Virginia developed a one week program called "Teachers Workshop in Nuclear Power Generation as a Public Issue" which included debates and other activities. This project integrated technical information with issues analysis. The project did not generate any published guides, materials or follow-up events.

There are two technical programs for teachers that do not deal with controversial issues. The Nuclear Concepts and Energy Resources Institute, funded by the National Science Foundation, presents a four week program, organized by the Department of Nuclear Engineering at Penn State University.

The University of Missouri, Columbia Department of Nuclear Engineering receives funding from Union Electric Company to sponsor "Nuclear Science Engineering for Secondary School Teachers."

Only Tanner (1979) has described a particular controversial issues teaching technique covering nuclear power generation. "The China Syndrome as a Teaching Tool" generally describes some techniques of media analysis such as the interpretation of bias and propaganda, emphasizing classroom implementation value. Some of Tanner's ideas (Tanner, 1976) are derived from his earlier curriculum covering teaching strategies for environmental issues.

ACCORD (1983), a consulting firm of conflict management professionals based in Boulder, Colorado sees itself as a problem solving group that can mediate difficult environmental conflicts. They have developed public involvement in the Three Mile Island case by developing a local training program to build local capabilities in communication, information sharing, meeting facilitation, and cooperative problem solving. The League of Women Voters (1981) have developed materials for community educators who want to set up debates about the nuclear power controversy.

Science and Social Issues: Some Recent Programs

Several investigators have considered integrating science and social issues. Roy (1985) suggests that teaching

about the interconnections between science and society will enhance science and technology literacy and perhaps begin to remedy the gross inadequacy of the math and science education of the average U.S. student. The National Science Foundation supports the Penn State Science, Technology and Society Program (directed by Rustum Roy). This project attempts to disseminate relevant curriculum which teaches technical content by grounding it in socially relevant issues. Newton (1983) has written Science and Social Issues which is concerned with social and ethical issues in science and presents several curriculum activities. Butterfield's (1983) Values and Biology describes the implementation of a controversial issues approach to biology teaching.

The most prominent contemporary controversial issues programs are the recent activities that cover peace education in a nuclear age. Both the National Education Association (1983) and Educators for Social Responsibility (1983) have published extensive curriculum which have received nationwide attention.

Educators for Social Responsibility published Perspectives: A Teaching Guide to Concepts of Peace which includes techniques for teaching about controversial issues. Additionally, ESR has a workshop program designed for teachers and administrators covering the following topics:

- "Conflict Resolution and Negotiation"
- "Science, Technology, and Nuclear Issues"

- "Politics and Bias in Teaching about Nuclear Issues"
- "Decision Making in a Nuclear Age: A High School Curriculum"

Issues Advertisements and Controversial Issues

Considerable work has been done linking the analysis of advertisements to critical thinking, especially regarding the interpretation of bias and propaganda. Olmann (1976) has contributed a particularly useful approach. But there isn't any material designed to help individuals decode the ideological content of corporate advertisements.

Bennett (1978) in "How to Defend Ourselves Against Corporate Image and Ideology Advertising" cites the growing importance of image advertising with ideological content. He discusses the availability of corporate ads, films, and educational documents and wonders what can be done to educate readers so they can view these documents critically. Bennett compliments what he calls the Orwell/Rank/Olmann combination of analysis, which emphasizes bias and propaganda techniques for ads analysis. He urges that students consider the ideological content of an ad as well, although he gives no specific guidelines for doing so.

Judith Williamson (1978) provides a comprehensive discussion of ideology and meaning in advertising. She uses an eclectic theoretical approach integrating neo-Marxism, structural anthropology, psychoanalysis and semiotics in an attempt to decode the ideological content of advertisements.

Williamson thoroughly considers how particular advertisements reflect the ideological foundations of contemporary perspectives on science, nature, and magic. She provides an important theoretical foundation which can be applied to practical curricular approaches to reviewing advertisements.

Other texts which consider the ideological content of advertisements include Dyer (1982), Berman (1981) and Ewen (1976). Dyer's introductory text covers the rhetoric of advertising, semiotics, and the language of advertising as she delineates a useful terminology that can be put to good use by educators. Berman and Ewen discuss the role of advertising in a consumer society.

Meadow (1981) focuses specifically on what he calls nonproduct corporate advertising. He develops a typology representing the nine dimensions of advocacy. Meadow warns that this sort of advertising:

> "may represent a new form of expression for ideological hegemony for which corporate planners had little use during a period of continual economic expansion. But as the limits to American economic growth are reached, corporate survival may become a political and ideological question, and hugh expenditures will be made to lobby the public." (p. 82)

Summary

The literature reveals that although controversial issues education has been the subject of considerable research and theoretical speculation, there have been very

few teacher training programs in the field. Moreover, nuclear power education typically has either a technical emphasis or is conducted by advocates of a particular position. There is a glaring gap in both discussions of and actual teacher training programs that deal with introducing the nuclear power issue as a controversial subject.

C H A P T E R I I I

THE CONCEPTUAL FOUNDATIONS OF CONTROVERSIAL ISSUES EDUCATION

Introduction

The purpose of controversial issues education (CIE) is to promote public debate, discussion, and analysis of any issue that impacts society. Participatory democracy thrives when a knowledgeable, decision-oriented, inquiring citizenry is willing to become involved in public policy.

Although democratic society cherishes the virtues of pluralism (and ideally, what is pluralism if not controversy) it is hard for individuals to be controversial. Controversy begets attention, it demonstrates difference, it introduces new ideas, it disrupts easy explanations, it challenges values, and it often places people under careful public scrutiny. The controversial route is often the difficult route because it requires individuals to challenge themselves and others.

Teachers and facilitators who wish to introduce CIE must be philosophically prepared to defend what might be perceived as an inappropriate educational method. Thus the objective of this chapter is to develop a philosophical

foundation which supports the educational and civic virtues of this approach.

Who is the preferred audience of CIE? Any community education project contains the seeds of controversy. Public forums, town meetings, and other formal issue-oriented settings as well as barroom discussions, Thanksgiving dinners, or any spontaneous situation can provide the context for controversy. So the guidelines described below are considered in a universal sense. But the most obvious target of CIE is the public school classroom.

The KNOW NUKES program was designed primarily as a teacher training workshop. The primary concern here is with classroom teachers. Nevertheless, a guiding principle of KNOW NUKES is the idea that teachers should become community leaders in establishing public forums on controversial issues. The KNOW NUKES project directors believe that the teacher should become a role model, not for the point of view that he/she espouses as much as for the ability to integrate school and community, the facility to promote constructive controversy, and the ability to implement methodologies that help schools become more exciting learning environments. The result is a more informed, more participatory student/community citizenry.

The working philosophy elaborated below describes how CIE integrates theory and practice in several broad areas:

participatory policy, educational psychology and group dynamics, and school/community relations.

Controversy, Ideology, and Mass Media

What makes an issue controversial? (Kupperman, 1984) What is it about a particular issue that allows it to become the subject of emotional public debate? An issue is potentially controversial if individuals have sufficiently diverse perspectives on the subject that their policy recommendations and/or personal action would lead in significantly different directions.

The notion "potentially controversial" is ambiguous and potentially misleading, yet at the crux of a difficult conceptual problem. There are explicit and implicit differences at the core of any controversy. The nuclear power controversy, for example, on the most superficial level is a debate which considers the productive efficiency, economic cost/benefit, and environmental impact of various energy alternatives. Many public policy debates about the viability of nuclear power deal with such factors exclusively. Yet on another level, the nuclear power debate raises questions regarding the American political-decision making process, international corporate power, economic growth/environmental quality, the form and structure of applied technology, etc.

There are levels of complexity and layers of controversy. Controversy is framed within an ideological context that structures the content of a debate. For example, if it is assumed that economic growth insures material prosperity and that social progress requires such prosperity then the nuclear power debate will not include a critique of consumptive lifestyles. Certain positions (the dramatic reduction of energy development) may seem outside the framework of legitimate discourse. Other positions may not even occur to the actors in a controversy.

Ideological content creates the boundaries of meaning for individuals within a culture. It represents the shared meanings which are so deeply embedded that they are the building blocks, the very foundation of the value systems and world view that determine one's understanding of everyday life. Within the ideological content of everyday life there are complicated values dilemmas. These dilemmas may represent controversial issues which address fundamental choices and perspectives about future directions that our society might take. But these dilemmas are not always explicit because they are defined within an ideological context. Hence controversy may never arise because the content of the controversy is just not accessible.

Ideology refers to the basic assumptions that comprise an individual's view of the world. It is very difficult to identify the ideological components of thought because

usually these assumptions are taken for granted, they are beyond questioning. For example, an important aspect of the nuclear power debate is the role of technology in solving environmental problems. Some people have a basic faith in technology and assume that technology enables humans to enjoy a very high standard of life. These people may equate human progress with technological progress. Others distrust technology and believe that technology inherently leads to environmental disruption and human degradation. Either of these assumptions may be the ideological foundation of an individual's perspective related to nuclear power development.

What determines which controversies receive public attention? The most important source for articulating controversial issues is the mass media. Individuals learn about controversial issues through their participation in everyday life. The media has become the central distribution source for information about controversy. Mass media defines the terms of social and political conflict. The terrain of political participation has shifted as mass communications have played an increasingly powerful role in the political decision-making process.

Todd Gitlin (1980), in The Whole World is Watching describes how the mass media structures the field of political controversy:

> "People directly know only tiny regions of social life; their beliefs and loyalties lack deep tradition. The modern situation is precisely the common vulnerability to rumor, news, trend, and fashion: lacking the assurances of tradition, or of shared political power, people are pressed to rely on mass media for bearings in an obscure and shifting world. And the process is reciprocal: pervasive mass media help pulverize political community, thereby deepening popular dependence on the media themselves. The media bring a manufactured public world into private space. From within their private crevices, people find themselves relying on the media for concepts, for images of their heroes, for guiding information, for emotional charges, for a recognition of public values, for symbols in general, even for language. Of all the institutions of daily life, the media specialize in orchestrating everyday consciousness- by virtue of their pervasiveness, their accessibility, their centralized symbolic capacity. They name the world's parts, they certify reality as reality- and when their certifications are doubted and opposed, as they surely are, it is those same certifications that limit the terms of effective opposition. To put it simply: the mass media have become core systems for the distribution of ideology. (P. 1-2)"

The ideological influence of mass media has become increasingly evident in the American presidential election process. Politicians frame their campaigns based on media access strategies. Particular candidates are more likely media successes.

Consider the consequences of the increasing prevalence and influence of professional polling research. Public opinion polls supposedly accurately reflect where people stand on particular issues. Sampling methodology assures us of its research credibility, and certainly the prophetic accuracy of election returns legitimates that belief. But the poll frames the inquiry, and the frame reflects

ideological bias. Individuals are asked to make choices that are defined for them, that require short and precise responses that can be rapidly tabulated, that actually stereotype positions. Public opinion polling symbolizes citizen participation, but it effectively masks difference through its ideological frame.

The format of mass media structures the presentation of controversy. Style and image replace substance and content within a particular ideological context. Gitlin explains how political movements rely on mass communications in order to have an impact or to feel that they can make a difference. Yet becoming newsworthy requires fitting into the media's definition of news (what an event, story, or protest actually is) and thus creating a style or image that conforms to the media format. Hence leaders become celebrities (Jesse Jackson appears on Saturday Night Live), issues become dramas, and commentary becomes entertainment. Controversy becomes a win or lose proposition, a popularity contest, a superbowl of political decision-making.

A philosophy of CIE which considers the relationship between ideology and controversy should make the following assumptions:

(1) It is essential to understand the ideological predispositions that frame, distort, negate or ignore controversy.

(2) Mass media is the most important source for distributing information about controversy.

What does this mean for citizen participation and controversial issues?

It underscores the importance of understanding how the ideological framework of media representation portrays controversy. CIE must uncover not only the perceived differences among contesting perspectives, it must also clarify and define different perspectives when they may not be immediately accessible. Thus CIE must cut through the superficiality of mass media representation of controversy.

Controversy, Ideology, and School Curriculum

The issue of controversy and ideology is particularly complex in the classroom. Schools serve a socialization function and, in effect, legitimate and determine what is appropriate knowledge. The educator must tread carefully when implementing CIE in the schools because certain issues are too controversial, which typically means they encourage scrutiny and moral judgments which the school and community would rather not confront.

Michael Apple (1979) in Ideology and Curriculum describes the part schools play in the socialization process and assumes that school curriculum must set the "ideological limits" for explaining why the institutions and culture of everyday life are legitimate.

He's concerned that the treatment of conflict in the school curriculum leads to "political quiesence and the

acceptance by students of a perspective on social and intellectual conflict that acts to maintain the existing distribution of power and rationality in a society. (p. 84)"

For example, most history and social studies school texts and curriculum materials present a biased view of the role and amount of conflict in American history. Conflicts are typically presented within a right/wrong or good/bad framework rather than as a constructive dialectic which results in social or political change.

Similarly, scientific knowledge is presented as if a consensus theory of science exists. Yet within the scientific community there is significant disagreement about methodology, research parameters, and interpretations. There is controversy within subgroups of the scientific community and this controversy often results in profound discoveries. Apple explains how ideological frameworks structure the parameters of inquiry in the school setting:

> "Two tacit assumptions seem to be prominent in teaching and in curricular materials. The first centers around a negative position on the nature and uses of conflict. The second focuses on men and women as recipients of values and institutions, not on men and women as creators and recreators of values and institutions. These assumptions act as basic guidelines that order experiences. (p. 86)"
>
> "While some of the better schools and classrooms are alive with issues and controversy, the controversies usually exhibited in schools concern choices within the parameters of implicitly held rules of activity. Little attempt is made to focus on the parameters themselves. (p. 87)"

But as Apple explains, conflict can serve a positive purpose in the social change process:

> "Since conflict brings about inherently new situations that to a large degree are undefined by previous assumptions, it acts as a stimulus for the establishment of new and possibly more flexible or situationally pertinent forms of activity. (p. 98)"

Conflict should be used "as a more objective foundation for designing curricula so that the more static hidden curriculum students encounter can be counterbalanced to some extent. (p. 99)"

Consequently the paramount objective of CIE concerns the critique of ideological assumptions:

> Objective (1): Learners must be able to identify, describe, and analyze the various perspectives that comprise a controversy.

This is a seemingly tautological objective. What is CIE if not a way of teaching about perceived differences? Yet ideological content homogenizes difference by making tacit assumptions about social and political reality. So-called unbiased, objective text may reflect a prevailing world-view that is not subject to critical scrutiny.

Students therefore should be encouraged to critically analyze symbols and text to uncover seeds of controversy and to use clear language that fully articulates different perspectives on an issue. Thus students could identify how supposedly neutral text may have a specific, if hidden, point of view. The identification of hidden perspectives and

their potentially emotionally charged contents enables the educator to set the table, to make clear what is at stake, and to allow students access to diverse perspectives.

Hence the importance of decoding ideological content, of understanding how the media frames controversy within a particular ideological framework, of understanding how the images and symbols as well as the actual rhetoric of media representation frame controversy.

Ideology, Bias, and Propaganda

Techniques of persuasion are pervasive in CIE discourse. The participants in a controversy want to convince others as to the righteousness of their cause/point of view. Moreover the psychology of persuasion is extremely complex. It is not always clear whether someone is being persuaded or doing the persuading. In everyday life conversation we spend a good deal of our time trying to persuade other people to agree with our point of view, to see things the same way we do, to act according to our expectations. In group situations we develop various techniques to accommodate our persuasive purpose. Sometimes we are conscious of those techniques, other times they are more subtle, perhaps an unconscious part of an interpersonal dynamic that is beyond conscious reflection.

This process becomes more sinister when it is crafted by professional persuaders. Mass media consists of a morass

of persuaders telling us to buy something or to vote for somebody or to act in a particular way. The American electoral process is permeated by sophisticated advertisements promoting candidates, issues, and lifestyles. Corporations and advocacy groups use magazine advertisements, op-ed pages, and various other means, often disguised as educational materials to promote their perspectives.

This is especially important as the education/advocacy agenda becomes blurred. Advocacy groups often disguise their literature as objective technical information to establish credibility with the reader. Sheila Harty (1979) in Hucksters in the Classroom documents the amount of curriculum material that corporate donors provide to our nation's schools. She explains how this material frequently promotes a particular perspective disguised as educational material.

This is a common problem in nuclear power education. Advocacy groups (utilities, citizen action groups, etc.) produce educational materials which ostensibly objectively describe various aspects of the nuclear power production process but are merely forms of propaganda designed to convince the student/citizen of a specific point of view. These materials appear as "technical information", written by "experts" in the field. They provide the reader with what

is supposed to be scientifically sound information and reasonable causal explanations.

The nuclear power controversy is replete with hidden biases that distort supposedly objective statements, propagandistic statements that are misrepresented as facts, and statements of deep ideological conviction that appear as fundamental truth.

Objective (2): Learners must separate bias and propaganda from factual information whenever possible.

Bias refers to the attitudes, opinions, and values that an individual or organization bring to written text and oral conversation. In the case of nuclear power, both utilities and citizen activist groups often have very strong biases (nuclear power can solve our nation's energy problems .... nuclear power plants are unsafe and should be shut down). It helps to know what that bias is before reading any text generated by either group.

Propaganda refers to information that is designed to convey a specific point of view. Although propaganda is often disguised as a statement of fact, it is distinguished by virtue of its main intention: to convince the reader or listener to believe in certain information or ideas.

CIE discourse must unravel bias and propaganda. This is of great value to teachers and students as it forces them to take a fresh look at their convictions and to examine difficult issues in a fresh new light.

Citizen Participation and Technical Knowledge

Discussions and debates regarding controversial environmental issues require more than critical consciousness of ideological content. Equally important is the rudimentary technical knowledge which hopefully informs the controversy. Individuals often base their opinions on an emotional response to a situation rather than a grounded understanding of the important technical data.

If an individual is opposed to nuclear power, he/she should understand whether the basis of the opposition is an adequate understanding of, let's say, the nuclear fuel cycle, or an intuitional fear inspired by the invisibility of radiation. An individual in favor of nuclear power should know whether his/her support is based on a rigorous knowledge of nuclear power safety systems, or a generic technological optimism.

CIE discourse requires adequate substantive knowledge of the subject area. This doesn't necessarily mean that individuals will have a different opinion once they understand the technical aspects of a problem. Nor does it mean that individuals should be expected to have the same technical knowledge as trained experts in a field before their opinions are valid. It's important not to defer to the experts just because certain aspects of an issue may seem intellectually inaccessible.

Several national commissions have recently addressed the so-called science education crisis, citing the poor science and technology preparation American students are receiving. This leaves the students ill-equipped to make informed decisions on issues of technology policy. The National Science Board Commission on Precollege Education in Mathematics, Science, and Technology (1983) stresses the importance of motivating young people to pursue careers in science and engineering but also emphasizes the civic importance of a technologically literate citizenry:

> "Such an early and motivating curriculum is also essential in providing the population at large with the general information concerning contemporary science and technology necessary to their own welfare and their role in the larger community. For them as well as for future scientists and engineers it is important that problem-solving and decision-making skills be developed so they can (i) cope with the complexity of the technological aspects which affect their lives and (ii) participate in a democracy where the masses influence decisions concerning the use of technology. (p. 3)"

It should not be the experts who decide the future of nuclear power (or any environmental issue). The role of the expert is to clarify difficult information or to describe recent research in a field. The notion of a technological priesthood that is uniquely qualified to make judgments on complicated technical matters is anathema to citizen participation.

> Objective (3): Learners must acquire an acceptable technical competence in controversial issues content so they can critically evaluate diverse interpretations of the content.

Technological literacy and CIE are an excellent way to facilitate science education. Students and teachers are motivated to excellence through involvement in tangible controversies of personal and community interest.

The Educational Psychology of Controversial Issues Education

There is a great deal of group psychology literature which describes avoidance of conflict in corporations, social service agencies, schools, businesses, etc (Bennis and Sheperd, 1956; Janis, 1972). Individuals avoid interpersonal conflict in organizations unless conflict is seen as constructive.

Johnson and Johnson's research review attests to conflict avoidance in schools:

> "Learning situations are filled with conflicts among students, between the teacher and the student, and between what a student presently understands and new information being learned. And the current evidence indicates that in most classrooms conflicts are avoided and suppressed and that teachers and students lack the skills and procedures needed for effective conflict management. (p. 51)"

Nevertheless conflict can play a positive role in organizational and educational situations. Coser (1956) claims that in open systems, conflict can have a stabilizing and integrative function. Conflicts tend to resolve tensions, allow for system readjustment, and redress disequilibrious conditions.

Johnson and Johnson (1979) claim that effective groups thrive on conflicts over ideas and opinions. Controversy improves decision-making, stimulates interest, builds cohesion, and encourages creativity.

The Johnsons' synthesis and research regarding cognitive development, group process, and conflict in the classroom provides an excellent foundation and rationale for CIE.

Reviewing the work of cognitive development theorists (Piaget, Kohlberg, and Flavell) and synthesizing current research on critical thinking, creativity, and problem solving, they hypothesize the process of controversy and cite research which empirically verifies the hypothesis.

> "There is evidence, therefore, that controversy can arouse conceptual conflict, subjective feelings of uncertainty, and epistemic curiosity; increase accuracy of cognitive perspective-taking; promote transitions from one stage of cognitive and moral reasoning to another; increase the quality of problem solving; and increase creativity. These findings support the hypothesized process by which controversy promotes learning. That is, the situation begins with students categorizing and organizing their present information and experiences so that a conclusion is derived. When they realize that other students (or the teacher) has a different conclusion, conceptual conflict, uncertainty, or disequilibrium is aroused. The conceptual conflict leads epistemic curiosity which, in turn, motivates a search for more information, new experiences, and a more adequate cognitive perspective and reasoning process. (p. 57)"

The nuclear power controversy involves numerous situations in which several prominent scientists might look at the same information and draw entirely different

conclusions. An excellent example is the controversy surrounding the setting of radiation standards. The effects of low-level ionizing radiation have been the source of much concern. There can be no certainty in drawing inference from the available data. Some scientists emphasize the limits of our ability to observe the long-term inter-generational effects of radiation exposure, our lack of understanding of how radiation effects change at the cellular level, etc. Nevertheless, other scientists will state with confidence that given the information available, we can set appropriate standards that will protect workers and the public. Others will argue that given our lack of certain types of data, standards must be set significantly lower. Responsible scientists interpret the same information differently.

If students are exposed to such different perspectives, they are typically motivated to figure out for themselves where they stand on the issue. If the contrasting perspectives are clearly articulated, a cognitive disequilibrium develops.

The student (1) experiences conceptual conflict, uncertainty, and disequilibrium (2) searches for more information, experiences, and a more adequate cognitive perspective and reasoning process (3) categorizes, organizes and derives conclusions from present information and experiences. (Johnson and Johnson, 1984)

The fourth objective of CIE emphasizes the importance of cultivating this cognitive disequilibrium.

> Objective (4): Learners must be exposed to opposing points of view which will generate a cognitive disequilibrium facilitating problem solving, creativity, the ability to overcome stereotypes, and the ability to accept meaningful compromise.

An important difficulty of CIE is the inability of participants in a controversy to fully understand and empathize with the opposing point of view. Why do people take the stands that they take? What can we learn from their world-view, value system, interests, and experiences that will help us understand their position on a particular issue? Individuals often deny the validity of a different perspective to further legitimate what may perhaps be an uncertainty about their own perspective. This is accomplished through stereotyping ("all people who believe something act a certain way"), whereas the motivations behind perspectives are often quite complex.

The constructive management of controversy requires that individuals cooperate to understand diverse perspectives. Johnson and Johnson (1979) describe this skill as perspective-taking, "the ability to understand how a problem or situation appears cognitively and affectively to another person. (p. 60)"

> Objective (5): Learners must identify the psychological motivations (norms, standards, values, criteria) that contribute to decision-making about controversial issues.

The Community of Controversy: Process and Accountability

There is substantial risk involved in structuring CIE. The teacher/facilitator must be prepared to deal with the range of emotions, attitudes, and perspectives he/she encourages to emerge. If improperly managed CIE can lead to misunderstanding, polarization, and stereotyping. Moreover, the facilitator must maintain the respect of the participants. Otherwise his/her credibility as a responsible educator may be questioned. Consequently, CIE must establish a community of controversy in which participants agree to specific communication rules, goals, and objectives.

Community of controversy describes a learning environment that allows diverse interests to openly express their points of view. It solicits the participation of those individuals and interest groups that are key actors in the discourse surrounding a controversial issue. Community implies that the participants establish communication rules that enable them to openly express themselves and to be willing to consider multiple and varying perspectives.

Objective (6): Learners must be able to develop/facilitate a community of controversy that values heterogeneity and establishes shared learning goals and objectives.

The most dynamic and most risky way to organize a CIE learning project is to include representatives of groups with dramatically different perspectives. For example, if

running a program on nuclear power, a community of controversy should include spokespersons from a utility that manages a regional nuclear power plant and spokespersons from a group that is critical of plant operations. The facilitator of this process must maintain his/her credibility and personal integrity while managing the learning program.

This raises the question of how to deal with personal bias. One must exercise considerable discretion (which will vary with each circumstance) in revealing his/her perspective at the appropriate time. In the following chapter, I will describe in detail how the issue of bias was confronted in the KNOW NUKES program. As a general rule the facilitator of CIE should, when asked, be honest and reveal his/her position. The classroom teacher is in a particularly precarious position when revealing his/her position in a controversy.

An effective CIE program faces the difficult challenge of enabling the community of controversy to engage in a constructive learning process. This requires respecting some fundamental rules of group process. The Johnsons (1984) have developed useful guidelines for transforming disagreement into a positive experience. They are extrapolated below:

(1) The context of controversy should be cooperative rather than competitive. Group members should place emphasis on making the best possible decision rather than on right/wrong.

(2) Honest and accurate communication is essential. Individuals should be able to understand, paraphrase, and recreate other members feelings and ideas without placing value judgments on the individual.

(3) The opinions of all group members should be valued and listened to. The power of each individual should be situationally balanced. All group members should participate in the discourse. Individuals should be encouraged to vent their emotions when necessary.

(4) Group members should concentrate on the substance of ideas, rather than particular personality traits. Individuals shouldn't take criticism of ideas as a personal affront.

(5) There should be several cycles of differentiation and integration during a project. Differentiation means highlighting the differences in group members positions. Integration involves finding areas of similarity and developing new approaches.

Objective (7) Learners must adhere to communication rules that emphasize effective group process, that are supportive of diverse perspectives, and that promote constructive controversy.

Issues of School and Community

There is a longstanding debate in the history of American education regarding the relationship of schools and the community. Molnar (1984) describes this as the recurring challenge of social issues.

> "On the one hand, educators are expected to help their students develop the capacity for democratic self-governance, for which it is widely accepted that students should acquire such desirable traits as inquisitiveness and the ability to reason and critically analyze information. On the other hand the historical charge to schools has been to create loyalty to a particular set of political ideas that are themselves not to be the subject of critical analysis."

Hence schools and communities have regarded controversy with considerable ambivalence. It is assumed here that schools become more interesting places if they deal with controversial issues that are relevant to the community.

Schools can actively facilitate CIE by structuring appropriate issues education and thereby facilitating citizen participation.

The ability to clearly articulate a position in a public forum on controversial issues is seen by Newmann, Bertocci and Landness (1977) as the foundation of civic competence.

> "The primary educational mission, therefore, is to teach citizens to exert influence in public affairs, for without the competence to influence the state, the unalienable right to do so (that is, the key feature of representative democracy) cannot be exercised. (p. 4)"

The schools tend to isolate individuals from meaningful decision-making processes. Newmann and Oliver (1970) argue that students typically learn about public issues from teachers who have studied the subject, not from the lawmakers, lobbyists, politicians, etc. who are actively involved in the issue.

> "Thus, by isolating students from adults most directly interested in controversy and by providing unequal opportunities for adults to become students, schools as we know them perpetuate an unrealistic view of public issues and inhibit opportunities for the

> citizen to act responsibly on the positions he formulates. (p. 319)"

There is some evidence which suggests that participation in relevant controversies provides students with the motivation to study the issue. King (1984) reports that most students who learn issues using the traditional textbook approach remember little of the issue-oriented information they encounter and customarily cultivate a disinterest, helplessness, and apathy regarding important contemporary issues. The details of a particular issue are less important than the experience of the issue.

CIE should emphasize the tangible relevance of controversy. How does a particular issue impact a student? The teacher should make controversy come alive, by enabling the student to actually experience the controversy. This occurs through access to key community figures, participation in forums, researching community opinion, and having the student actively find the community resources that can help inform him/her about the issue.

Another virtue of incorporating the key actors in the controversy is that it will also involve institutions that might not ordinarily cooperate and thus provide a role-model for other kinds of cooperative ventures between the institutions. In the case of schools, students should be encouraged to work with or have access to these actors/institutions. For example, students studying the

nuclear power controversy could work with utility educators and citizen action groups that are opposed to nuclear power. They should take field trips to both the nuclear power plant and the administrative headquarters of the action group.

Objective (8): Effective CIE encourages learners to actively utilize community resources.

When learners experience the full dimensions of a controversial issue, they understand the impact that the controversy may have on public policy, lifestyle decisions, and problems of moral choice. They perceive the controversy as alive, as a real problem that people care about, a problem that motivates individuals to sacrifice personal or institutional time and energy. This breaks down the barrier between school and community and allows for the continuity of school and community experience.

The Feasibility of Implementation

The implementation of a controversial issues program raises theoretical, logistical, and administrative problems that restrict the teacher/facilitator. There are numerous practical circumstances in which the most clearly stated educational objectives are misconstrued, distorted, or found philosophically inappropriate. These situations might include skeptical school boards, recalcitrant school administrators, or inaccessible community leaders/resources.

There is a substantial literature which addresses this problem from several perspectives including the rights of teachers, appropriate policies for school districts, criteria for determining relevant content, and approaches to bias and objectivity.

There are such a wide variety of educational environments that it becomes impossible to elaborate specific implementation guidelines. Interested practitioners can refer to the literature (Gallagher, 1984; Butterfield, 1983) to find guidelines that are most appropriate to their situation. This chapter, by suggesting the main concepts and virtues of CIE, establishes a broad philosophical rationale for the implementation of CIE programs. Practitioners can determine which approaches are most useful for a given situation. Each community education circumstance will require an individualized approach. The most important skill for the practitioner is the ability to defend his/her philosophy and rationale and to prepare a relevant implementation strategy.

The following chapter is a case study of a specific implementation strategy. The KNOW NUKES Institute is a teacher training model which prepares practitioners to implement a nuclear power education program.

C H A P T E R I V

THE KNOW NUKES INSTITUTE: A CASE STUDY IN CONTROVERSIAL ISSUES EDUCATION

An Informal Interlude: The Origins of KNOW NUKES

Several years ago (September, 1981) during a faculty meeting of the Antioch/New England Environmental Studies program, we were brainstorming ideas which might form the basis of exciting public education projects. Antioch University prides itself as a higher education institution that has a century long tradition of developing socially purposeful, innovative programs. That attitude, which permeates Antioch/New England as well, encourages the integration of school and community and thereby challenges the faculty to develop interesting new program ideas.

This particular brainstorming session, or Environmental Studies Think Tank as we jokingly refer to it, was markedly uneventful. We reviewed a series of unimaginative, trite, and unchallenging ideas. Someone suggested in a peak of creative cynicism that we run a program on nuclear power. This seemingly laughable idea was plainly the project that couldn't work. Not only was the general public bored with the nuclear power brouhaha but there were already numerous advocacy groups involved in public education about nuclear power. To exploit this fantasy to an extreme it was suggested that a project

include the most diametrically opposed representatives of the controversy. What if ..... folks from the anti-nuke groups would work with folks from Vermont Yankee and Seabrook in an effort to plan a program together?

As is often the case, moments of frustrating frenzy yield interesting ideas. Wouldn't it be interesting, we thought, to invite the appropriate representatives to an exploratory planning meeting? What would be the potential for developing a teacher training program on the nuclear power controversy? These would be the same individuals who were frequently public antagonists, who had refined accommodating public personas but who seethed underneath with disdain for their opponents. Or at least that's how the Environmental Studies faculty imagined it.

Yet this seemed intuitively to be a fascinating idea. Environmental Studies programs often suffer from a stultifying homogeneity arising from a provocative self-righteousness that reinforces ideological positions and creates illusions of support in a fundamentally growth-oriented world. Here was an opportunity to develop an educational program that would be planned by individuals with diametrically opposed positions. This was a very healthy prospect indeed.

But we wondered whether our idea would be intriguing to these appropriate representatives. Would they attend a

meeting? Would they work together? We contacted four individuals representing the New England Coalition on Nuclear Pollution, the New Hampshire Energy Coalition, Vermont Yankee, and Seabrook Station. All agreed enthusiastically to attend a planning meeting to discuss the viability of a teacher training program.

We explained to the group what the purpose of our meeting was: to plan a nuclear power education program that would directly confront the controversial issues involved, that would cultivate controversy in an effort to stimulate knowledge about nuclear power, that would achieve balance rather than neutrality, that would integrate technical knowledge with techniques for teaching about controversy. The participants agreed in principle that such a project was sensible and risky, but worth pursuing.

The inevitable next step followed. How would this project be funded? We explained that we would apply to the United States Department of Energy as part of their Faculty Development in Energy Education Program. This was the moment where the inner thoughts of the participants would have been most revealing. The Reagan Administration's budget cuts were prominent news. If the intense competition for remaining federal science education grant money wouldn't do us in, conservative ideology certainly would. It was well known that the Republican Department of Energy was strongly in favor of rapid nuclear power support and development. It was

highly unlikely that they would fund a program that encouraged controversy about nuclear power. So the meeting participants could easily agree on their willingness and commitment to such a project, knowing fully well that the likelihood of the project coming to fruition was indeed miniscule. Moreover, they might have wondered about these Antioch/New England people. How would they be able to overcome these difficult funding odds?

Several months later we received a phone call from the Department of Energy. They were funding our project pending some budgetary revisions. And so we have the origins of the KNOW NUKES Institute.

Introduction

The main purpose of the KNOW NUKES case study will be to determine its relevance as a model for a controversial issues training program. The project will be reviewed in two broad areas: a description of the KNOW NUKES planning process including discussions of program planning and development, funding strategies, and community involvement; a description of the KNOW NUKES teacher training model including discussions of the various techniques, exercises and materials (Chapter 5) developed by the institute.

The approach of this study includes an assortment of methodologies. Participant/observation will be emphasized. Numerous events and circumstances can only be described

because there was no formal evaluation process constructed for the multitude of experiences that were observed by the project directors. But this approach shouldn't be seen as methodology by default. The nuances and subtleties of program planning and curriculum development are most effectively understood in their totality. This is accomplished through an introspective review of the general impact of the training model.

The participant/observation method becomes most meaningful when it employs conceptual criteria so the researcher has guidelines for his observations. The preceding chapter established the conceptual foundations of CIE. Commentary and discussion is oriented relative to the eight objectives established in the previous chapter.

However, several formal evaluation mechanisms have existed for various aspects of the KNOW NUKES programs. These include general evaluations of the teacher training programs (as organized by the funding agency) as well as evaluations of the specific teaching techniques. Additionally, the project directors hired evaluators to research program impact in the classroom. These evaluations will be referred to in the appropriate sections.

KNOW NUKES: A Brief History

A. Original Assumptions

The KNOW NUKES Institute was created to help science and social studies teachers introduce the nuclear power controversy in their classrooms. It was assumed by the project directors that secondary school teachers are inadequately prepared to teach their students about nuclear energy in such a way that is engaging for students, that clearly outlines how nuclear power plants work, that describes the perceived advantages and risks, that emphasizes the part nuclear power plays in New England's energy future, and that generates a personal understanding and stake in these issues.

Many schools and teachers feel unqualified to introduce this subject matter for several reasons: they do not feel competent in the subject matter; they do not feel that they can appropriately balance and teach the controversial material, and they are hesitant to integrate additional material when they feel overburdened with their current responsibilities.

This coincided with a perceived regional and national crisis concerning the effectiveness of classroom science teaching. KNOW NUKES was designed to give high school teachers a professional development opportunity that would encourage them to take school and community leadership on an emergent technical issue. An important goal of KNOW NUKES is to give teachers additional stimulus to stay in teaching by

encouraging them to introduce relevant contemporary material in their classrooms.

Nuclear power was initially chosen because it has such a controversial history in New England. Typically, public and private discussions about nuclear power are replete with difficult differences of opinion. Moreover, it is sufficiently interdisciplinary that it holds interest for the science teacher and social studies teacher. In fact, KNOW NUKES participants have come from a wide range of disciplines.

Several premises which guided Antioch/New England in its various teacher training programs became the conceptual foundations of the project:

- training is most successfully achieved when teachers are actively involved in the modification and adaptation of existing curriculum materials which will be used in their classes;
- subject matter which could remain abstract must be presented in a tangible, practical, lab-oriented way if students are to be sufficiently motivated;
- through the study of a controversial, regional issue teachers and students are motivated to consider the broader aspects of that issue.

B. Funding Sources

In September 1982, Antioch/New England submitted a grant to the United States Department of Energy. At that time DOE, through its Faculty Development Projects in Energy Education was supporting various science and social studies

projects related to energy education. The Antioch project, "Nuclear Energy: A Training Program for Northern New England Secondary School Teachers" received $31,316 to (1) give teachers a technical background in various aspects of the nuclear energy issue (2) facilitate a curriculum adaptation process which would allow participants to develop self-contained modular curriculum units which could be easily integrated with standard disciplinary curriculum.

The project received excellent evaluations from the participants and the advisory board (see evaluations below) and thus the project directors were encouraged to seek additional funding for future programs. However, the DOE energy education program was terminated in 1983. This occurred simultaneously with a dramatic cutback in Federal science education programs.

Antioch/New England developed a new funding strategy which emphasized (1) widespread public promotion of the KNOW NUKES idea and (2) active solicitation of interested public utilities. Thus KNOW NUKES workshops were offered at various education conferences (The United States Environmental Education Congress, The New England Environmental Education Conference, the New Hampshire Science Teachers Association, and the Vermont Department of Education). Simultaneously, the project directors contacted utility educators who were interested in the KNOW NUKES idea. Several consulting

packages were developed in which the KNOW NUKES staff would train utility educators using the KNOW NUKES model.

The only tangible outcome from this work, which lasted approximately one year, was a $2,500 grant from the Edison Electric Institute, a research and education consortium funded primarily by utility companies. This funding was designated to organize a weekend workshop (October 1984) as part of the National Association of Environmental Education Conference. After considerable planning, this workshop was cancelled due to underenrollment. However, Edison Electric agreed to let the KNOW NUKES Institute use the grant money to seed future programs.

During the fall of 1984, Antioch/New England explored several additional funding alternatives. The National Science Foundation announced new funding for science education programs in its Office of Scientific and Engineering Personnel and Education. Also, the project directors hired a fund raiser (with Electric Edison seed money) to contact various private foundations which might be interested in the KNOW NUKES model. Both of these new funding ventures yielded grants. The National Science Foundation awarded Antioch/New England $67,000 to honor excellent science teachers from rural New England and enable them to integrate nuclear power curriculum in their classrooms. This project ran in July of 1984. Polaroid Foundation ($5,000) and Vermont Yankee Corporation ($1,000)

awarded Antioch/New England small grants which were eventually used to help produce an extensive nuclear power curriculum book.

In November of 1984, Antioch/New England sought refunding from the National Science Foundation to run a similar honors program during the summer of 1985. In March, 1985, Antioch received notice that the project was funded at the proposed level ($76,224).

Throughout this period, Antioch/New England Graduate School indirectly supported KNOW NUKES by allowing two of its faculty members to spend a substantial amount of their time working on the development of the KNOW NUKES idea, especially when the availability of outside funding was relatively risky.

The Planning Process

A. Fundamental Assumptions

Initially, the greatest challenge facing the KNOW NUKES project directors was to develop a planning group that could work together in spite of their dramatic differences on the nuclear power controversy. The credibility of the project depended on the support it received from the key advocates of the contrasting positions.

The KNOW NUKES staff made several assumptions regarding the planning process:

(1) Nuclear power education must emphasize the controversies involved.

Most nuclear power education, especially in the region served by the project (New England) was primarily advocacy education. Public utilities and citizen advocacy groups had developed education programs that were mainly useful for individuals or groups that had already made their mind up on the subject. KNOW NUKES would be distinguished by its ability to incorporate the diverse perspectives. If the KNOW NUKES program was heterogeneously endorsed, it would contribute to nuclear power education. But this endorsement would have to reflect true support, rather than a perfunctory acknowledgment of a balanced program. Both the utilities and the advocacy groups would have to believe in controversial issues education.

(2) Controversial issues education is most effective when it has diverse participation and involves the university, the public school, private industry, and community groups.

Issues education frequently includes diverse membership, but for KNOW NUKES it was essential that representatives from these groups actually plan the program. This would accomplish several objectives. It would allow those groups to better understand their perspectives and allow them to overcome their stereotypes of each other. It would insure that the teacher training program would have the fullest access to the resources of both groups. It would

provide a model for other institutions, demonstrating the viability of the controversial issues approach and reaffirming the plausibility of heterogeneous involvement in educational program planning.

(3) Education programs are highly stimulating when a cognitive disequilibrium exists.

The previous chapter outlines the educational psychology of fostering a cognitive disequilibrium. Yet this same process greatly improves program planning as well. Our hope was that the planning board, despite the strength of any individual's convictions would constantly have their fundamental assumptions challenged. This would occur over a long term basis in which frequent exposure to alternative perspectives would demand fresh attention be given to any issue. In a sense, the planning group would model the teacher training process which it would implement. In considering how to set up the program, which speakers to get, what exercises to choose, etc. the planning group would experience the same cognitive disequilibrium that would occur for the teachers.

(4) A successful planning process would result in excellent promotion of the project.

It was essential that the program have the full philosophical support of the planning group. If that were the case, the group would serve as excellent representatives of the project idea within their particular constituencies.

The utility representatives would publicize and support the project among other utility educators; citizen advocates would work within their network, etc.

B. Developing a Planning Group: Implementing a Community of Controversy

This section will cover some of the difficulties inherent in facilitating a controversial issues education planning group. As an extrapolation of the KNOW NUKES experience it will emphasize the difficult decisions that faced the project directors during the KNOW NUKES planning process.

(1) Strange Bedfellows

The most obvious and difficult first step is to choose the size and members of the planning groups. For the KNOW NUKES project, the project directors desired to keep the group small enough that it could develop some intimacy and actually plan an educational program. But the group also had to be large enough so that one individual couldn't dominate the group or single-handedly reinforce a stereotype. The final decision was to have two utility representatives, two citizen advocates, two Antioch/New England faculty members (the project directors) and one public school science teacher.

The specific members were chosen from the most active organizations in the Northern New England nuclear power

controversy, in this case, representatives from the Vernon nuclear power plant of Vermont Yankee (Barbara Martocci, Energy Information Director), Seabrook Station of Public Service Company of New Hampshire (John Cavanaugh, Manager of Energy Information Center), the New Hampshire Safe Energy Coalition (Kirk Stone, Director) and the New England Coalition on Nuclear Pollution (Cia Iselin, Education Director). These were individuals who in some cases had known each other. Cavanaugh and Stone had appeared representing different sides at heated public hearings. But none of these individuals had ever worked closely together, even those who were on the same side of the issue.

The other members of the planning group included Charles Butterfield, a biology and chemistry teacher at Brattleboro High School in Brattleboro, Vermont and Mitchell Thomashow and David Sobel, Antioch/New England environmental studies faculty members and KNOW NUKES project directors.

(2) Planning Group Communication

The primary group communication objective was to allow for an open discussion atmosphere. Group members needed the ability to state whatever was on their mind without any sense of retribution from other members. Rather, in the interest of "cognitive perspective taking" individuals should develop an empathy for the opposing perspective. When disagreements occurred individuals were urged to disagree

with the idea rather than with the personality of the individual.

It was important to establish that all members of the planning group were dedicated educators and that their primary purpose in participating was to develop an excellent nuclear power issues program. It was important to recognize that an advocacy agenda was also present, but not primary. The project directors wanted to develop a primary commitment to the concept of controversial issues education.

The most difficult facilitation problem was to allow creative conflict to emerge without the advocacy agenda overwhelming the purpose of the meetings. If the participants are always on their best behavior, one risks the inevitable "seething underneath" or the absence of the interesting ideas that often develop from conflict situations. On the other hand, the purpose of the meetings was not to debate the virtues of nuclear power, but to plan an educational program that would allow teachers to consider the relative merits of nuclear power.

This type of facilitation is most possible when the group facilitator develops credibility among all group members. When leadership credibility is established, group members trust the leader's ability to recognize creative conflict and to channel it appropriately.

(3) Credibility and Morality

The director of a controversial issues project must establish credibility. By credibility I refer to an attribute and a process; the group participants must trust the expertise, leadership, and moral sincerity of the director. They also must respect the group leader's ability to direct the group dynamics of the planning process. These are equally important categories.

The KNOW NUKES experience allowed us to extrapolate several observations about establishing credibility. Most importantly, the director must be completely honest about his/her view on any issue that arises. Although one risks alienating the individuals who have a different point of view than the project director, if he/she does not reveal his/her stand, the hidden advocacy agenda will ultimately interfere with effective leadership. The group participants would always be wondering about the advocacy motivation of the leader.

For example, during the KNOW NUKES planning process, the project directors revealed their perspective on nuclear power at the first meeting. They also emphasized that their primary commitment was to the virtues of controversial issues education and not to their advocacy position, yet they recognized that implicitly their advocacy agenda could emerge. They strongly urged the group to flag such a situation.

Our experience reveals that to overcome the implicit advocacy agenda the project director also runs the risk of bending too far to meet the needs of the opposing perspective. During the KNOW NUKES project, the staff was asked to understand and empathize with the opposing perspective as much as they possibly could. This was excruciatingly difficult for some individuals, especially project interns who would at times question the morality of their participation.

For example, the culture of an environmental education program is typically anti-nuclear. The project directors were constantly scrutinized because they were working with diverse perspectives rather than fighting nuclear power. Moreover, any introspective leader must confront that issue when implementing a CIE program. Is my time better spent working as an advocate for my position? Anyone who is involved with public policy and/or political action must confront such an issue which cannot be wished away. In effect, such a dilemma serves as a conscience for the CIE project director. The most positive outcome should be a clearly stated rationale for the virtues of the CIE approach.

This issue is constantly present. One of the most intriguing aspects of running the KNOW NUKES program has been the immersion in advocacy networks. To get excellent speakers one must spend considerable networking time finding

the most appropriate talent. This means, in part, contacting advocacy speakers bureaus, resource centers, etc. Most often the contact person at the bureau would assume that the project director had the same perspective as the bureau. Our approach was to emphasize the CIE philosophy and to work from there, but often the CIE philosophy was seen as a front to get funding for an advocacy position or as a way of acknowledging but not respecting the alternative perspective.

Our experience indicated that the hidden advocacy agenda didn't effect our leadership as much as it plagued our conscience. Everyone respects a professionally run project. As long as fundamental communication rules were respected and the actual program ran smoothly the credibility of the leadership was rarely questioned.

(4) Decision-making and Accountability

Ideally, a CIE planning group will take significant responsibility for determining the educational program. This not only improves the actual program content but it invests the planning group in the outcome of the project. Two types of dilemmas could conceivably arise. The project director must overcome any tendency to take too much control of a program but also must be willing to exercise appropriate leadership. There might be some circumstances when a consensus is not administratively possible, in which case,

the project director must make an important decision for the project.

A more difficult problem arises when a planning group member will not take adequate responsibility for the outcome of the project. During the planning process for the Summer 1982 program one group member when asked for an opinion would often tell the project director that it was Antioch's project. This wasn't so much a deferential approach as it was a failure to take responsibility for the project outcome. The project leader must determine how to invest this type of individual with more accountability without alienating him/her and jeopardizing additional participation. Our observation is that the project director must evaluate the job circumstance of the individual who may feel legitimately threatened by an unapproved participation. The guideline for KNOW NUKES has been to sincerely offer decision-making responsibility to a planning group without overwhelming them with accountability issues. If the accountability problem is simply intolerable for the individual, he/she might not belong on the planning group.

(5) Resources and Educational Suggestions

An interesting aspect of implementing a CIE project is the discovery that group members may not agree on the importance of particular issues. In planning a program many decisions will inevitably get made to determine which

material will get covered and how the material should be sequenced. The group may not completely resolve these decisions but they should at least plan the conceptual framework of the project. For example, in reviewing the 1982 summer program, two particular planning group members agreed that the project was excellent, but one of them, a utility educator, believed that too much emphasis was placed on the connection between nuclear power and nuclear weapons. The other member, an advocacy group representative thought that the most glaring substantive weakness of the project was its inability to cover that very issue. The important point is that both individuals supported the value of the project despite this difference.

The planning group typically has excellent access to speakers, resources, and educational materials. In this case, the advocacy agenda of the members should be emphasized. The group members should be asked to provide names for the best possible speakers on the various issues. They should use their organizational affiliation as much as they possibly can.

(6) Balance or Controversy

It is essential that a controversial issues project be perceived by the planning group, project participants, and the outside world as balanced. What exactly does balance mean? We refer to balance as the representative

availability and strength of contrasting perspectives. Each member of the planning group must believe that the project has selected the most effective speakers for the education program. Balance is not a middle-of-the-road approach which squelches controversy and passion. This is not necessarily immediately grasped by a planning group. In some cases, such as the presentation of what is perceived as technical information, i.e., how a nuclear power plant generates electricity, it is helpful to have a speaker who is perceived as neutral. Balance does not require that every exercise or written material developed by a project represent contrasting perspectives. Rather it is the sum total of project activities that is evaluated. The death knell for the credibility of a CIE program is a perceived lack of balance.

Project Design

The purpose of this section is to review the general design of the KNOW NUKES summer teacher training programs. This will be achieved by providing a description of the pedagogical goals and objectives and reviewing the project's implementation philosophy. The criteria for considering project design and analysis are based on the conceptual foundations described in Chapter 3. Although the actual

format of the program has changed between 1982 and 1985, the basic guiding principles have remained the same. The project description below reflects the 1985 program. This section will be followed by a summary of the evaluations of the 1982 and 1984 programs. The specific teaching techniques that were used will be covered in the next chapter.

A. Goals and Objectives

The broad pedagogical goals and objectives for the KNOW NUKES training program were initially outlined during a planning group meeting on May 24, 1982. They have been modified on several occasions. Some of the objectives listed below have been described in greater detail in Chapter Three.

1. To achieve a sound understanding of the technical aspects of nuclear energy development.

    a. Understanding the ecological/economic pathway of nuclear energy production.

    b. Understanding the nuclear power generation process.

    c. Introductory knowledge of the physics of nuclear radiation.

    d. Familiarity with current research on the effects of ionizing radiation on biological systems.

    e. Familiarity with alternative fission reactor designs.

    f. Understanding how nuclear waste is generated and the controversial dilemmas surrounding nuclear waste management policy.

g. Familiarity with the technical issues covered in debates about nuclear power plant safety.

2. To achieve an understanding of how individuals form opinions about issues and establish criteria for making decisions about nuclear power.

   a. Understanding of how various interest groups influence opinion formation.

   b. Understanding that there are many ways of looking at an issue; developing empathy and understanding for alternative points of view.

   c. Awareness of the cognitive factors involved in attitude formation; how individuals select what they learn, the psychological motivations that contribute to personal decision making (standards, criteria, norms, and values).

   d. Understanding how different groups and individuals evaluate risk, how risk analysis is used as a public policy tool.

   e. Familiarity with the various techniques of persuasion that are employed with the use of different communications media.

   f. Ability to evaluate the importance and method of cost/benefit analysis in policy formation.

   g. Understanding the urgency of dealing with the nuclear issue; how to implement the sense of urgency in professional and private life.

   h. Familiarity with the economic issues that influence public policy regarding nuclear power.

3. To achieve awareness of the curriculum materials, resources, and methods of implementation that can be used in educating students about the nuclear power controversy.

a. The ability to identify, describe, and analyze the various perspectives that comprise a controversy; to clearly state evidence supporting contrasting perspectives.

b. The ability to separate bias and propaganda from factual information whenever possible.

c. The ability to expose students to opposing points of view which will generate a cognitive disequilibrium facilitating problem solving, creativity, the ability to overcome stereotypes, and the ability to accept meaningful compromise.

d. The ability to develop/facilitate a community of controversy that values heterogeneity and establishes shared learning goals and objectives.

e. The ability to teach communication rules that emphasize effective group process, that are supportive of diverse perspectives, and that promote constructive controversy.

f. The ability to use materials from different disciplines in teaching about nuclear power.

g. Learning how to create, modify, and implement original curriculum ideas; making sure the curriculum is understandable, adaptable, and meets the needs of the target student body.

h. The ability to utilize community resources in the classroom.

i. The ability to consult with and instruct other educators who are interested in implementing a controversial issues approach.

j. The ability to use the nuclear power controversy to motivate students to learn scientific content in biology, chemistry, physics, and/or general science.

k. The ability to apply controversial issues teaching techniques to a variety of emerging contemporary issues.

B. Program Description

The KNOW NUKES summer workshop is a two week residential program. The NSF grant pays for the participant's tuition, room and board, materials, and travel.

The general guidelines for project design are described below. A complete list of the sequence of the 1985 KNOW NUKES program can be found in the Appendix. Demographic information about the participants is described later in this chapter.

Our experience indicates that the most active learning occurs when the program design offers a multitude of educational formats. Rigorous lectures and lab experiences must be balanced with problem solving activities, controversial issues discussions, and various participatory approaches. Consequently the two-week training program involves a mix of field trips, lectures, lab demonstrations, experiments, debates, reviews of prepared handouts and assigned readings, group discussions, media presentations, and curriculum implementation strategies.

During the first week of the project, teachers study the technical and substantive aspects of nuclear power generation. This includes a visit to a nuclear radiation laboratory (Lowell University); a field trip to a nuclear power plant (Seabrook station); laboratory exercises and

lectures covering radiation physics, the nuclear fuel cycle, and nuclear power generation; and application of the technical information to controversial issues through exploration of a difficult, regional current events problem. Teachers receive numerous written materials which emphasize the practical application of nuclear power issues for classroom use.

The emphasis for the second week is curriculum adaptation, techniques for teaching controversial issues, and leadership training. This includes the development and modification of existing curriculum materials for classroom adaptation. Teachers work with two curriculum guides which were developed in previous KNOW NUKES summer institutes. Each teacher constructs an implementation plan to insure the effective application of the substantive knowledge and CIE approaches covered during the workshop.

The training staff represents a diversity of instructors including prominent scientists from the engineering and academic community, science educators, community activists, and public officials. They are selected according to their ability as effective communicators. How accessible can they make complicated information?

An important aspect of the KNOW NUKES 1985 program is a comprehensive follow-up program. We have found that despite the best intentions of the teachers, they are typically overwhelmed with other responsibilities during the

school year and are unable to implement as many of the KNOW NUKES ideas as they would like. The follow-up program includes leadership training, on-site consultation, in-service workshops, and other support and advising by the KNOW NUKES staff. Some of the issues regarding follow-up will be discussed below.

Project Participants

The KNOW NUKES programs were primarily designed for science teachers. All three grants (1982, 1984, 1985) emphasized that the project was a professional development opportunity for New England science teachers who otherwise might not be willing to incorporate new techniques in their classroom teaching.

The participant profile includes information on subject and level taught, and for 1984 and 1985, the average years experience. Seventy-six (76) of the eighty (80) participants over the three years have been from New England.

1982

22 participants

16 high school, 4 junior high, 2 elementary

14 male, 8 female

13 Biology and Environmental Science

3 Chemistry and Physics

2 Earth Science

2 Industrial Arts and Home Economics

2 Social Sciences

1984

28 participants

21 male, 7 female

9 Biology and Environmental Science

7 General Science

5 Several subject areas in science

4 Physics

2 Social Sciences

1 Chemistry

Average years teaching: 16.5

25+	5
15-24	11
10-14	7
5-9	4
0-4	1

1985

30 participants

20 male, 10 female

Biology	10
Physics	7
Chemistry	7
General Science	4
Public Educators	2

Average years teaching:	17.3
25+	6
15-24	12
10-14	4
5-9	2
0-6	6

Project Impact

A. Evaluation Overview

Various aspects of the KNOW NUKES program could be subject to interesting evaluations. In the long term, the most important evaluation would concern the actual classroom implementation that results from attending the institute. The following section overviews the project impact by discussing the evaluation highlights of the 1982 and 1984 summer training programs.

We were initially concerned with determining whether the project participants considered the project worthwhile, that is, did they gain substantive knowledge about the nuclear power controversy, and did they acquire classroom materials and techniques which they intended to implement?

The KNOW NUKES Institute has used several evaluation instruments for the 1982, 1984, and 1985 summer programs. These included a series of general evaluation forms which were completed at the end of the program. One form gathered

general information about the whole program, another asked specific questions concerning particular speakers and exercises. The Institute also used an interim evaluation form which asked for specific comments about a particular day's activities. This allowed the project directors to monitor the project on a daily basis. The 1982 program required a final narrative evaluation to be submitted to the funding agency. The 1984 program hired professional evaluators to consider both the institute and the implementation activities of the teachers. This information was not available at the time of this dissertation. The evaluation instruments can all be found in the appendix.

1. The General Evaluation (1982, 1984, 1985)

The general evaluations, used for both the 1982 and 1984 projects yielded some interesting results. Participants were asked to rate on a one-to-five (one most favorable, five least favorable) scale their response to a series of questions. All the participants completed these forms. The project directors main concerns are described below. The figures in parentheses represent the 1982, 1984, and 1985 results.

- The extent to which participants met their objectives in attending the workshops.

  (1.45, 1.36, 1.17)

- Whether the participants substantially increased their knowledge of nuclear power.

  (1.65, 1.38, 1.50)

- Whether controversial issues were presented in such a way that all sides were given a fair hearing.

  (1.50, 1.52, 1.40)

- Whether the workshop provided information and experience that were applicable to the participants teaching.

  (1.35, 1.32, 1.40)

- Whether the participants felt the workshop would be of long term benefit to their teaching.

  (1.60, 1.62, 1.93)

2. Evaluation of Speakers and Exercises (1984, 1985)

At the end of the 1984 and 1985 programs, all participants were asked to consider whether the various techniques and exercises they were exposed to were challenging, interesting and replicable for classroom use. A one to five (1-5) scale was used with one being most favorable and five being least favorable. From this information the project directors were able to determine which exercises should be repeated in other training workshops. The cumulative totals for the fifteen exercises (1984, 1985) were:

Challenging	2.06, 2.08
Interesting	1.84, 2.01
Replicable	1.79, 1.95

All participants completed an evaluation form which considered whether the lectures and presentations were challenging, interesting and informative. The same one to five scale was used.

Challenging 2.26, 2.37

Interesting 1.85, 1.95

Informative 1.79, 1.96

The complete details of these evaluations are available in the appendix. Further discussion of the various techniques and exercises is covered in Chapter 5.

3. The Informal Evaluation Process (1982, 1984, 1985)

The project directors have organized their informal evaluation discussions by considering the following categories: quality of instruction, balance, participant interaction, understanding of nuclear power, curriculum design process, implementation of curriculum, and controversial issues teaching techniques (covered in chapter 5). In each case below I have listed the important questions we asked in each category and have summarized the most relevant observations.

a. Quality of Instruction

The following questions were paramount:

- Did the speakers and staff present material clearly and concisely?

- Was the content appropriately rigorous?
- Were a variety of interesting teaching techniques used?
- Were the background readings and handouts useful?
- Did the speakers have sufficient expertise?
- Did the speakers stick to the topics they were supposed to speak about?
- Did the participants have enough access to the speakers?

One of the major difficulties in projects such as this, when the scientific expertise is brought in from outside the sponsoring institution, is the risk that the speakers will not adequately gauge the expertise of their audience. This is compounded when you have an interdisciplinary, heterogeneous group of teachers with different technical expertise. This can be alleviated in part by providing the participants with background readings and by making the decision that a minimum level of expertise is required knowledge.

Generally the speakers have been good communicators, that is, they have made difficult technical information accessible to the layperson. This can be partly guaranteed by spending considerable preparatory time with the speakers. It's necessary to discuss the background of the audience, to carefully provide details to the speaker regarding what he/she is expected to cover, and to discuss the specifics of the information he/she is expected to convey.

The speakers' expertise was not an issue, rather our concern was with their ability to communicate the expertise. When speakers were involved in debates, an entirely different dynamic was evident. Not only did the speakers wish to communicate specific content, but they wanted to convince the audience that their point of view was credible. The debates were most interesting because speakers challenged each other, were challenged by the staff, and often raised provocative questions for the participants.

It is extremely valuable for the participants to be exposed to a wide variety of speakers (Nuclear Regulatory Commissioners, professional engineers, etc.) Impressions of the speakers vary according to the participants point of view or disciplinary orientation.

We tried to design the sessions so they wouldn't be top-heavy with lectures, but rather there would be a good mix of learning activities. For example, James Asselstine, a nuclear regulatory commissioner, was used as a consultant for a simulation exercise. Thus the teachers could work with him in a collegial setting. Speakers varied in their adaptability to this kind of format. Typically, speakers would take more time than expected. It was very difficult for them to condense so much interesting and complex material into a short time frame. The project directors had to very carefully manage time boundaries to avoid enormous time overruns.

Participants have little time to thoroughly read background material. Their time is so filled during the project that they tend not to use the background material as much as they should. To overcome this problem for the 1985 program, all background materials were sent to participants in advance of the project. Typically background material should provide a minimal expertise in relevant subjects, but should also contain useful bibliographical information for future reference.

b. Project Balance

- Were different perspectives on the nuclear power controversy given equal time?
- Was the material presented in a balanced sequence?
- Did the staff and advisory group participate equally?
- Were the participants a balanced group?

The directors tried to maintain a scrupulously balanced program. We tried to have relatively even numbers of speakers representing contrasting perspectives. Similarly the participating teachers were chosen not only on the basis of their teaching ability but also on their predisposition regarding nuclear power. According to all of the evaluations we received, it was almost unanimously agreed by the participants and the staff that balance was maintained as much as was predictably possible. This was a key element in the general success of the project. If the balance had not

been achieved the directors would have lost their credibility and the entire project would have been suspect.

At some point in the project, the participants wish to know the predisposition of the project directors. Our experience is that they don't formally ask such a question until they are comfortable with them personally which usually takes a week. Until that time they try to deduce their predisposition. We try to establish project credibility first, then we reveal our perspective in detail in front of the entire group.

c. Participant Interaction

- Did the participants have enough of an opportunity to express their points of view?
- Did the participants develop skills that enabled them to listen more clearly to views different than their own?
- Did the participants challenge each other?
- Did the participants have enough collaborative challenges?

Our greatest anxiety revolved around potential conflicts between participants that could prevent them from adequately working together. It's one thing to develop a training technique to solve such a problem, it's something else to implement it successfully in the world of real personalities. We were aware that people develop unfortunate stereotypes and although we hoped that our group could transcend such a problem, we didn't want unmanageable

personality problems. Yet at the same time we wanted to encourage participants to disagree, to honestly state their mind, and to be willing to engage in controversy. The participants interacted in a way that met our most optimistic expectations. They challenged each other respectfully and professionally, they came to better understand opposing points of view, they worked well collaboratively, and many became good friends, despite their ideological opposition.

Early in the first week of the projects we ran a listening exercise which demonstrated how difficult it is to listen to other people (we often have predetermined ideas about what others say) and suggested skills for improving listening techniques. Although we obviously couldn't change a lifetime of personality development, people were generally on their best behavior in this regard.

All three groups (1982, 1984, 1985) were serious about their learning. They worked with great effort, they were honest and demanding, they were highly motivated, they understood the importance of their work, and they felt privileged to participate in the project.

More information on the collaborative exercises is presented in Chapter 5.

d. Understanding of Nuclear Power

- Did the participants receive sufficient training in the nuclear power controversy so they could teach the subject adequately in the classroom?

It is extremely difficult to make any judgments in this regard. The participants are thoroughly immersed in thinking about nuclear power, they engage in numerous problem-solving exercises which are designed to reinforce basic nuclear power principles; in short, they eat, sleep and drink nuclear power for two weeks. But short of specific tests it is difficult to ascertain what they will remember and utilize. At the very least most teachers have the following:

- A thorough introduction to the most important aspects of the nuclear power controversy.
- Basic understanding of the nuclear fuel cycle, nuclear power generation, nuclear waste, radiation, and the politics of nuclear regulation.
- An overview of the important resources (utility education centers, educational literature, bibliographies, reading materials, etc.)

e. Curriculum Design Process

- Did the participants design materials that could be easily implemented in the classroom?

The curriculum design process was one of the unique aspects of both projects. Participants worked in small groups divided into specific content areas. Each group spent several days extrapolating materials from the first week of the project and forming it into usable curriculum modules. Teachers came away from the project with something they had

designed for their own classes. On the last day of the project the different groups shared their products with other groups.

The best of these materials formed the core of two published curriculum guides. KNOW NUKES: A Nuclear Power Issues Curriculum Guide was published in Spring of 1983. It has been through two printings, and has received widespread national dissemination among energy educators. It includes material on moral dilemmas, techniques of persuasion, and values issues as they can be applied to the nuclear power controversy. A second, more extensive curriculum guide covering the technical aspects of nuclear power as well as controversial issues, including numerous problem-solving exercises will be published in October of 1985, to be used extensively in the forthcoming KNOW NUKES programs.

These materials represent an excellent outcome of the curriculum design process as a staff of teachers, scientists, curriculum writers, and Antioch faculty collaborated to produce an innovative curriculum guide.

Implementation of Curriculum

- How will this curriculum be used in the classroom?

This is a critical question in evaluating the success of the project. For the 1982 and 1984 projects we designed

two processes which hopefully facilitated curriculum implementation.

(1) To receive credit for attending the seminar each participant was required to generate a comprehensive dissemination/implementation plan which outlined in detail how he/she expected to use the material. These plans were generally well conceived and thought through.

(2) The project directors offered to visit the classrooms of the participants and stage a nuclear power debate as an introduction or conclusion to a unit on nuclear power.

Nevertheless there was no way of knowing if various KNOW NUKES teaching techniques were being implemented in the classroom. For the 1985 project we have incorporated leadership training sessions and an implementation coordinator whose specific task is to work closely with participating teachers after the summer institute.

Our assumption is that new material learned in professional development seminars is most effectively integrated into the high school curriculum when the opportunity to apply the new material is followed by the chance to then consult with peers, graduate school faculty, and experts in the field, on the issues that emerged in presenting the materials. Thus we have developed a school year support program which includes on-site consultation and support, peer meetings, visitations from Antioch faculty, and additional school year workshops at Antioch.

Further, teachers who demonstrate leadership ability and the interest to work more actively in their district will work closely with Antioch staff and the support of their regional school administrators to develop an in-service workshop for other teachers in their district. This will be a stipended participation.

C H A P T E R V

THE KNOW NUKES INSTITUTE: TEACHING TECHNIQUES FOR CONTROVERSIAL ISSUES EDUCATION

Introduction

The KNOW NUKES institute has experimented with and implemented a variety of teaching techniques that are designed to facilitate controversial issues education. The purpose of this chapter is to describe the various exercises and activities within the context of the controversial issues education goals and objectives that are listed in Chapter 3.

The participant-observer approach is utilized for this chapter. Any of the techniques described below could be analyzed and tested at great length. The Advertisements Technique is the subject of a more rigorous experiment (Chapters 6 and 7). The intention of this chapter is to link the theory and practice of CIE by explaining some of the specifics of CIE training. This is another aspect of the KNOW NUKES implementation strategy, the subject of Chapters 4 and 5.

These exercises are described by summarizing their goals and objectives, illustrating the context of their use, detailing how they were actually implemented, offering some

evaluative commentary, and considering some classroom adaptation possibilities. It is assumed that many of these activities will be useful for any controversial issues program; they are versatile enough to be used in a variety of educational environments, not only for nuclear power education. It is hoped that the reader will freely adapt any exercise for his/her own use. Several of the activities have been expanded and will be treated at greater length in a forthcoming curriculum guide.

The KNOW NUKES institute has been designed according to phases of instruction. These phases are briefly explained below.

PHASE ONE emphasizes the importance of the CIE approach. Participants are taught communication rules, the value of constructive controversy, how to identify controversy, and the necessity of cognitive perspective taking. It is important that the group members develop cohesiveness, that they have a sense of their personal resources, that they conceive of themselves as working towards similar goals. This phase also emphasizes technical instruction and the importance of understanding the key technical issues of a CIE program.

PHASE TWO actively engages the participants in group problem solving, simulations, debates, and the consideration of moral dilemmas. The program structures experiences that

will foster cognitive disequilibrium. Participants are expected to better understand the psychological motivations that underly personal and public decision-making. They are expected to develop a firm understanding of the technical issues that are the subject of public controversy. It is assumed that they have achieved enough confidence in the CIE process that they can publicly challenge their peers.

PHASE THREE represents the application of CIE materials for classroom use. Participants are expected to adapt their training so they can engage in CIE exercises and understand how they might be used to help motivate their own students.

Listed below are abbreviated descriptions of the eight conceptual objectives more fully described in Chapter 3. These objectives are the basis for organizing this chapter. Exercises are described according to which objective they are primarily designed to accomplish.

Clearly many exercises might accomplish several objectives. The phases discussed above should be viewed accordingly.

The Abbreviated CIE Objectives (See Chapter 3)

1. Identification of controversy
2. Bias and propaganda
3. Technical competence
4. Cognitive disequilibrium

5. Psychological motives and decision-making
6. Develop a community of controversy
7. Communication rules
8. Utilize community resources

These objectives should be used as a guideline for reviewing the various KNOW NUKES training activities.

Table 1: KNOW NUKES Training Activities

Activity	CIE Objective	Phase
Advertisements methodology	1,2	1
Ecological/economic pathway	1,3	1
China syndrome activity	2,5,3	1
Methodological belief	2,4,5,6	2
Nuclear power coloring book	3	1
Lowell reactor	3,8,4	1
Quantitative exercises	3,7	3
Seabrook, Vermont Yankee	3,8,4	1
TMI computer simulation	3	2
Reactor safety debate	4,3,8	2
Newspaper article	4,2,5	1
Kurt's dilemma	4,5,3,2	2
Jimmy's dilemma	5	3
Values line	5,6,1	3
Quantification of risks	5,4,3	3
Collective question formulation	6,4,7,3,1	2
Indian point simulation	6,3,5,4,8	2
Demographic information	6	1
Listening technique	7,6,1	1

Ecological/Economic Pathway (1,3) PHASE ONE

This exercise is primarily designed to allow participants to figure out how much they know or don't know about the nuclear fuel cycle. It serves a secondary purpose

as well, which is to identify aspects of the nuclear fuel cycle that are the source of controversy.

Students are randomly placed in groups of four. Each group is given newsprint and magic markers. Their task is to draw a diagram of the nuclear fuel cycle, depicting the various steps of the nuclear fuel production process, from the mining of uranium to the disposal of radioactive wastes. The nuclear fuel cycle is described as the ecological/economic pathway of uranium as that expression indicates that the fuel cycle is more than a technical process, but involves complex ecological and economic impacts.

Students are also asked to indicate which steps of the fuel cycle have been controversial, i.e., uranium mining has resulted in tailings which were mixed in concrete that became the foundations of houses in Southwest Colorado. Each group is given approximately forty-five minutes to complete the exercise. Upon completion, the instructors display all the diagrams on a large wall, so they can be compared and discussed. Groups are asked to discuss their diagrams. A list of questions is developed, reflecting information that the group still requires. The instructor "fills in" some of the missing pieces of information, or highlights particular controversies.

This is an excellent introduction to the KNOW NUKES program because participants work together, pool their

knowledge, and identify controversy through what is typically a cooperative group process. Participants quickly discover how much they don't know about the technical aspects of the nuclear fuel cycle. This raises many questions which are then asked of the various experts who speak at the institute.

An interesting variation of this exercise, which we suggest for classroom use, is to have certain groups perform the exercise for nuclear power and others for coal, oil, or wood energy sources. This becomes the basis of an interesting comparison and places the nuclear power issue in a broader energy context. The exercise should be used at the start of a project and it is most appropriate for upper level high school classes, college classes, or community education programs. It can be used for most any environmental issue that involves resource use. It answers several fundamental questions: Where does the resource come from? How is it processed? How is it used? What are the ecological and economic impacts of its use? How is it consumed? How is it disposed of?

China Syndrome Activity (2,5,3) PHASE ONE

The purpose of this activity is to raise questions about nuclear power safety, to examine the role of bias and propaganda in decision-making, and to understand the psychological motivations that contribute to attitude

formation about nuclear power. This activity also raises questions about the role of movies in highlighting public controversy.

The movie, The China Syndrome was released in early 1979, several months prior to the Three Mile Island accident. It was a particularly controversial movie because it intimated that utility companies were more concerned with questions of profit than insuring public safety, and it depicted many nuclear engineers as individuals who were so blinded by their faith in nuclear technology that they overlooked fundamental safety questions. It was clearly an advocacy movie whose purpose was to raise difficult questions for the nuclear industry.

The KNOW NUKES institute used this movie as both a springboard for discussion and a method to provoke further interest in the technical aspects of nuclear power production. The movie is shown to the entire group (early in the project), using VCR equipment so that it can be easily started and stopped. We analyze the movie with two individuals, a licensed nuclear operator, and a critic of nuclear power safety. At key moments in the film, the participants or instructors can ask to have it stopped so questions can be asked of the speakers. For example, when the first signs of the accident are occurring, the instructors ask the nuclear operator if this sequence of events is theoretically possible or science fiction.

Typically, the speakers have different interpretations of the event, raising many additional questions for the participants.

One of the most notable comments of several institutes occurred during this exercise. While watching the movie, participants are glued to the screen during an accident sequence, when the control room is depicted in relative chaos. The seemingly hum-drum, if not boring routine existence of nuclear operators is transformed into hair-raising danger, with alarms, flashing lights, etc. Our visiting nuclear operator when asked about the reality of this situation replied that the work of a control room operator is 99.9% boredom and .1% sheer terror. Certainly this provoked stimulating discussion.

The film is an excellent foundation for raising issues of bias and propaganda. Participants are asked what kinds of techniques of persuasion the movie uses (how is emotion used to make a point? were images or interviews used in or out of context? how was credibility established, through personalities or through backdrop images? how were the images in the movie structured?) and about the quality of the information presented (did it clarify or cloud the issue? how complete was the information?).

In depicting stereotypes of the actors in the nuclear power controversy, the movie fosters discussion of the motivations that underly public protest, network news, and

corporate finance. Participants are given the opportunity to discuss whether these motivations are accurately portrayed or whether they are manipulated to prove a point. The participants can discuss how stereotypes are developed and perpetrated and whether they are susceptible to believing in them.

This has been an excellent exercise for the KNOW NUKES institute because it provokes stimulating discussion and raises technical questions. It is difficult to use in a classroom because of the sheer length (3 hours) of the exercise. Imaginative teachers can find ways to use parts of the film, or to show it over several sessions. Exciting movies such as The China Syndrome stimulate great interest for all levels of students. Thus we recommend the use of this technique for most units (upper level high school, college) on nuclear power.

Methodological Belief (2,4,5,6) PHASE TWO

This exercise is adapted from Peter Elbow's essay "Critical Thinking is not Enough" and is widely used by the group Educators for Social Responsibility. It is based on what Elbow (1983) describes as methodological belief: "the systematic, disciplined, and conscious attempt to believe everything-- to believe all hypotheses, premises and inferences, no matter how unlikely or repellent they seem-- in order to find virtues or strengths we otherwise might

miss." Elbow claims that methodological belief is as intellectually serious and disciplined as critical thinking, a much more common and approved approach.

> "The central event in the believing game ..... is the act of affirming or entering into someone's thinking or perceiving. It implies a pluralistic model of knowledge: the idea that the truth is often complex and that different people often catch different aspects of it; and that we get closer to seeing correctly by entering into each other's conflicting perceptions of formulations."

This exercise was used by the KNOW NUKES institute to help develop cognitive perspective taking, to allow individuals to enter the world of a contrasting perspective on nuclear power.

We set this up by briefly explaining the concept, and underscoring the rationale for its use. In this case, it's essential that participants trust the reasons for entering a perspective that they might view with repulsion. This is followed by showing two contrasting films on nuclear radiation, both propagandistic, both representing definitive, almost self-righteous perspectives. A discussion follows in which individuals discuss what they learned about the nuclear power controversy by trying to believe both films.

We have found that this exercise may promote cognitive perspective taking, but, more importantly, it powerfully constructs self-doubt about a previously unshakeable

perspective. The participant is more willing to ask tough questions about his/her approach to an issue.

This is a difficult exercise to implement because doubt and skepticism are so ingrained in our approach to truth, and certainty is so difficult to question, that it requires a skilled practitioner in a trusting educational environment. The exercise may be inappropriate in certain high school environments. Nevertheless, it has great flexibility depending on the texts that are chosen as the substantive content of the exercise. As a first step, it might be easier to try such an exercise with a softer controversy (the drinking age) as opposed to one that generates heated emotions (abortion). Also it can be implemented with less propagandistic texts. However, in certain circumstances, it is precisely the jarring quality of the exercise that has important psychological effect.

Visits to Seabrook, Vermont Yankee, Lowell (3,8,4)
PHASE ONE

The field trip to nuclear reactors is a highlight of the project for several reasons:

- the participant gains a tangible understanding of how a nuclear reactor works; it is seen in operation.
- the participant may experience a small dose of ionizing radiation thus raising real questions about the health impact of a small exposure.
- the participant observes the ambience that surrounds an operating reactor and a nuclear power plant under

> construction. The visit to a reactor is a powerful experience because of the sheer magnitude of the operation. The participant also observes nuclear power practitioners at their work site.

Each of the visits accomplishes several purposes. We originally (1982) visited Vermont Yankee and Seabrook Station. The Vermont Yankee tour is no longer available, which is unfortunate because it was an outstanding learning experience. The visitor to the plant, after initially touring the Vermont Yankee education center and viewing films and exhibits about nuclear power, is driven to the nuclear power plant. After a thorough search procedure by uniformed guards, the tour visit begins. Each group is given a geiger counter so they can determine which areas of the plant are relatively radioactive. There is no better way to completely illustrate the nuclear power production process then to witness the dynamics of the plant in operation. For example, by seeing which parts of the plant emit the most radioactivity, the participant can understand the relationship between radioactivity and power production, and can better visualize safety precautions and potential problems.

Yet as important as the plant visit is for facilitating technical competence, the occasion also stirs up all the doubts or certainties that individuals have regarding the health effects of radiation. A trip through Vermont Yankee exposes individuals to 3-10 millirems of

radiation, the equivalent of a chest x-ray. For some participants, this is a trivial amount without possible health impact, for others there is concern about the dosage but they take the risk because of their curiosity to see the plant in operation, and for a third group this risk is entirely unwarranted and they refuse to go inside the radioactive areas. This generates at a personal level the emotional concerns about nuclear power safety, but it also raises the question as to what are appropriate radiation standards. All participants are motivated to study the health effects of ionizing radiation.

Since the unavailability of the Vermont Yankee tour, we have organized a trip to the radiation laboratory at the University of Lowell. The Lowell staff instructs the participants about radiation and guides them through several experiments. The participants observe the Lowell experimental reactor and the spent fuel storage pool. A similar situation to Vermont Yankee exists here as participants are exposed to a 3-10 millirem dose of radiation.

Seabrook Station is a nuclear reactor which is under construction. It has been a particularly controversial plant because of numerous cost overruns, the feared bankruptcy of Public Service of New Hampshire, and the Clamshell alliance civil disobedience action of 1977. The plant tour gives the participants an opportunity to view a plant under

construction; they walk inside the reactor vessel; they go to places, that assuming the plant becomes operational, will never be visited again because of their extreme radioactivity. One is struck at Seabrook by the sheer magnitude of the construction project. It is hard to imagine a greater concentration of capital and resources in a single spot. Participants who have faith in large-scale projects of this sort are typically awed by the project. Participants who distrust the scale of such operations are skeptical. Thus the visit to Seabrook reinforces the understanding of the relationship between one's predispositions about high technology and his/her view of nuclear power.

Nuclear Power Coloring Book (PHASE ONE), Quantitative Exercises (PHASE THREE), TMI Simulation (PHASE TWO) (3,7)

These exercises are all designed to facilitate technical competence about nuclear power through group problem solving.

The nuclear power coloring book is an unlabelled diagram of a nuclear power plant. After a lecture on nuclear power plant operation, participants are divided into small groups to see if they can pool their knowledge to complete the diagram (Venus paint-by-numbers style). By actually filling in the diagrams themselves they understand the dynamics of power plant operation (the flow of water through the system, the design of the safety systems, what parts of

the system are radioactive, how the nuclear reaction generates electricity). The participant also becomes familiar with the important terms that are used to describe the nuclear power production process.

The TMI simulation is a detailed computer software exercise, which depicts numerous aspects of nuclear power plant operation. It demands close attention (approximately one hour of training is needed before the program is accessible) and presents the participants with active challenges as various maintenance procedures must be respected if the plant is to operate smoothly. Mastery of the simulation provides the participant with a good understanding of the pressurized water reactor. This is set up as a group activity as three or four participants work at each computer.

The quantitative exercises are various math challenges that use the subject of nuclear power to facilitate group problem solving. Participants are asked to compute the radioactive half life of a particular element, determine the number of atoms in a pinhead, etc.

These exercises present the participants with the opportunity to work cooperatively on non-controversial problems. The challenge is to work together to solve the problem. They are designed to be easily implemented in the science classroom.

Reactor Safety Debate (4,3,8) PHASE TWO
Indian Point Simulation (6,3,5,4,8) PHASE TWO

During the KNOW NUKES institute an entire day is spent looking at the problem of nuclear reactor safety. Our main intention is to expose the participants to the widest variety of opinions regarding nuclear power plant safety. A secondary objective is to allow the participants to articulate those same perspectives by structuring activities that demand participation. Outside consultants are an important part of the day's activities. For the 1984 program we invited James Asselstine, a nuclear regulatory commissioner; Gordon Thompson of the Union of Concerned Scientists, and Karen Adelson representing the Westinghouse Corporation. Although we wanted the participants to listen to presentations delivered by these speakers, we also provided them with opportunities to work with the speakers in informal settings.

The highlight of the morning is a nuclear safety debate, structured using formal debate rules. The participants have already been through the "methodological belief" exercise and have carefully considered the use of bias and propaganda in the nuclear power debate. Consequently they listen both for substance and persuasion. We have found that these debates are carefully scrutinized by the participants who quickly understand the propaganda techniques that the speakers might employ. For example, in

Karen Adelson's case, she described her conversion from anti-nuclear activist to nuclear engineer. She explained that her attitude shift occurred when she realized the magnitude of our energy demand. The participants questioned her credibility as a result of this comment because they interpreted it as part of a designed manipulation. The reactor safety debate becomes, in fact, an opportunity for the participants to apply what they have learned in previous exercises about methodological belief, bias and propaganda, and critical thinking. They evaluate the speakers by discussing the strengths of their relative arguments and the persuasive techniques they use.

The afternoon activity is a simulation regarding whether the Indian Point Power plant in New York State should be allowed to have an operating license without having an approved evacuation plan. Typically, evacuation planning is a symbolic way of dealing with nuclear safety. Depending on your confidence in the nuclear power process you will be more or less inclined to implement strict evacuation guidelines. Many activists have used inadequate evacuation planning as a court tool of last resort to stop nuclear power plants from operating. Nuclear utilities have seen evacuation plans as an unnecessary delaying tactic which is purely a front for a radical anti-nuclear position.

Several days beforehand, participants are given reading materials about the Indian point situation. These

are provided by the advocacy groups that have been fighting the plant and the the nuclear utility. They are told that they will participate in a mock hearing. The guest speakers serve as consultants for the two sides. The nuclear regulatory commissioner is a consultant for a group of regulators who will judge the quality of the various arguments and make a decision.

The virtue of this simulation is that it encourages the participants to summarize their arguments succinctly and to advocate them before their peers. Thus the simulation is an excellent exercise for high school and college level classes. Many of the participating teachers have implemented some form of this simulation in their classrooms.

Newspaper Article (4,2,5) PHASE ONE

Nuclear power is constantly in the news. A controversial issues project has much more urgency if the participants are dealing with questions that are contemporary. An interesting exercise is to find a recent newspaper article on nuclear power and read it to the participants. The instructor should read the article twice; in the first case, editorializing and commenting as if he/she is opposed to nuclear power; in the second case, the commentary should reflect solid support for nuclear power. It's essential that the instructor employ the appropriate nuances and emphases for each reading.

This activity powerfully demonstrates how text can be interpreted dramatically differently depending on an individual's predisposition concerning an issue. It also shows that the instructor is capable of understanding how individuals with contrasting perspectives might interpret the article, thus gaining him/her necessary credibility.

Kurt's Dilemma (4,5,3,2) PHASE TWO

The purpose of this exercise is to promote cognitive disequilibrium, to understand the psychological motivations behind decision-making, and to promote technical understanding of the biological effects of low-level ionizing radiation.

Participants are given a moral dilemma to solve which is described below. A high school graduate needs money to attend college. He is unsure whether he can get a loan. Yet his parents clearly cannot send him to the college of his choice. He could go to a more easily affordable state college. The young man, Kurt, lives near a nuclear power plant. He understands that the plant is looking for jumpers, individuals who are paid to do short-term work which involves cleaning out the hot spots of a reactor during a routine clean up. He would receive a radiation dose for this work which is less than the federal standards yet significant enough to risk health effects, at least according to certain experts. Yet he could make

significantly more money performing this job than he could doing anything else. What should Kurt do?

The participants are given background reading material which includes a sanguine treatment of radiation, which would lead to the conclusion that Kurt is not taking an unnecessary risk, and an article which describes "jumpers" as the lackeys of nuclear utilities, individuals who are working at great risk and are not told about the risks they're facing.

After reading these articles, participants are asked to form groups according to how they would advise Kurt. Each group creates a hierarchy of reasons. The groups evaluate and critique each other's reasons. Simultaneously the groups list questions that represent technical information that is necessary to solve this problem. During the afternoon session, two scientists with different perspectives on the adequacy of contemporary radiation standards address those questions.

This exercise is seen as an excellent way to stimulate motivation to learn the technical aspects of radiation. The participant wishes to learn about the risks involved, is less likely to trust the opinion of experts and will attempt to gather as much information as possible in order to advise Kirk judiciously. This motivation is further strengthened after the visit to a nuclear reactor and the consequent radiation exposure (even though the magnitude of the

exposure is far less than it was in Kurt's case). It is suitable for high school classrooms.

Jimmy's Dilemma PHASE THREE

This situation recreates the circumstances that occurred to one of the graduates of the 1982 institute. Jimmy Karlan, a participant in the KNOW NUKES program, was taking part in the tour of the Vermont Yankee nuclear power plant. During a conversation with Barbara Martocci, the director of the energy center, Jimmy critiqued the educational virtue of the tour, explaining that the tourguides were unknowledgable ideologues regarding nuclear power, and that there was no balance in the educational presentation. Jimmy considered himself an opponent of nuclear power and Ms. Martocci knew that.

Several weeks after the project Ms. Martocci called Jimmy and asked him if he would consider being hired as a consultant to redesign the Vermont Yankee educational tour. Jimmy was taken aback, skeptical, but open-minded. He was curious why he was asked to do this as Barbara knew his predisposition regarding nuclear power. She replied that she thought his ideas were good ones and she would like to implement them.

This is Jimmy's dilemma. What should he, in fact, do? Does he "sell out" to the utility by working for them? Or

does he gain the opportunity to "balance" their program and initiate some exciting educational ideas?

This is the basis of an excellent moral dilemma which we have presented at KNOW NUKES one day workshops. Participants are divided into groups arbitrarily regardless of what they think Jimmy should do. One group determines the reasons why he should do it, another why he shouldn't. After analyzing the motivations behind these reasons, participants are asked to state their own opinion regarding Jimmy's consulting future.

Values Line (5,6,1) PHASE THREE

This is a technique which was adapted from the numerous values clarification materials of the early 1970's. Participants are asked a question and instructed to place themselves on a line (marked with tape in a large room) according to their opinion on the question.

During the institute we asked the question: Would you build or buy a house within one mile of a nuclear power plant? We performed this exercise on the last day of the project to determine where people stood on the issue after completing the workshop. However, this method can be applied for numerous topics and can be implemented at any point during a workshop. It's virtue is that it literally forces participants to take a public stand on an issue.

Quantification of Risks (5,4,3) PHASE THREE

An important aspect of public policy concerning nuclear power is the question of risk. How much risk is posed by the nuclear energy process? Numerous studies have been commissioned by the public and private sector to quantify the degree of risk of a major nuclear power accident. One famous study declared that the risk of a severe meltdown was the equivalent of an individual being struck by a meteorite. Other important studies have estimated that a major nuclear accident is likely once every twenty-five years. These are complicated issues which are beyond the scope of this chapter.

However, in studying nuclear power it's important that individuals understand the concept of risk analysis and confront the extent to which they feel nuclear power represents a tolerable or intolerable risk. This judgment requires more than an assessment of the actual safety of nuclear plants but also involves decisions regarding the importance of energy development, the affluent lifestyle, quality of life issues, etc. Risk analysis figures are presented by nuclear power critics and supporters to show the "relative" danger or safety.

For educational purposes, it is interesting to make the risk concept more tangible by asking participants a series of questions regarding their evaluation of risk. This

can be the basis of a group profile which establishes what the group considers to be the limits of risk. For example, a series of questions are distributed on a sheet of paper where the individual marks a spot on a line to determine how he/she evaluates the risk of a given energy/environmental policy. On a second sheet of paper a different series of questions can determine the relative risk of activities of personal choice (smoking, mountain climbing, etc.) The question sheets are then collected, quickly tabulated and reported back to the group. This establishes the concept of the relativity of risk. Mountain climbing, which might be terrifying for one individual may be the favorite hobby of another. It is interesting to compare the judgment of such voluntary activities with decisions about public policy. This greatly aids perspective taking as individuals have a much better sense of the value foundations that underlie decisions about personal and public activities.

Collective Question Formulation (6,4,7,3,1) PHASE TWO

The purpose of this activity is to develop a question and answers session that is relevant to the goals of controversial issues education.

After a speaker has finished his/her presentation, a fifteen minute question formulation period is announced. Groups are divided by fours, comprised to the extent possible of individuals who represent contrasting

perspectives. Each group is asked to construct and rank three questions that they would like to ask of the speaker. During the question answering session each group is called on to present their most important question.

The virtue of this approach is that it encourages perspective-taking, constructive competition, and just plain good question asking. It can be adapted at various educational levels for any controversial issues content.

Demographic Information (6) PHASE ONE

This exercise is designed to familiarize group members with the resources of the group in an imaginative way that sets an atmosphere for group problem-solving and cooperative learning.

During the first evening orientation of the 1984 program, we developed a series of questions that would be the basis of a composite profile of the participants. Questions ranged from practical ones (where do you teach, live? how long have you been teaching? what do you teach?) to substantive ones about nuclear power (are you a supporter or critic of nuclear power? have you previously studied nuclear energy?) to personal questions (what is the best book you've read in the last twelve months? what are your hobbies? who is your favorite presidential candidate?). Groups are broken down by threes, and each group is given one question. They are asked to interview all of the other

participants and find the answer to the question for each person. They are expected to return to their group of three and tabulate the results and then report their findings to the reconvened large group.

This is an excellent ice-breaker which should precede formal introductions. It immediately familiarizes individuals with each other in an intriguing way, it's often humorous and sets an excellent tone for establishing a community of controversy during the following days of the project.

Listening Technique (7,6,1) PHASE ONE

This exercise is designed to demonstrate how difficult it is to hear someone else's perspective on an issue, how we often hear what we would like to hear rather than what was really said.

Groups are broken into threes. They are given a controversial issue unrelated to the content of the program (abortion). They are asked to quickly develop a two minute statement on the issue. Assuming the three group members are A,B,C the procedure is as follows: A tells B his/her statement and C documents the statement. B tells C and A documents, C tells A and B documents. The documenters in turn report the conversations and individuals respond as to the accuracy of the reporting.

Typically there are important misunderstandings that are reported. In a larger group discussion, participants are asked what was the basis of the misunderstanding and how such a problem could be avoided for future discussions during the project. Out of this conversation, the group can develop communication rules which they should contractually adhere to for the remainder of the project.

C H A P T E R V I

THE ADS TECHNIQUE RESEARCH DESIGN

Advertisements and Controversial Issues

Of the numerous teacher training techniques and materials developed by the KNOW NUKES institute, the author has chosen to research the potential impact of a technique that trains users to identify controversial topics in issues advertisements. This decision has been guided by several factors: advertisements are ubiquitous, as curriculum they are easily obtained and adapted for diverse educational uses; advertisements are typically attractive, they engage students and teachers because of their rich symbolic content; the analysis of advertisements can be implemented with a variety of subject matter in the physical, natural, and social sciences; the ads technique can be taught in one-half hour; pilot testing of the technique has demonstrated that its stimulating and provocative. Thus the ads technique has potential impact beyond the nuclear power controversy as it might conceivably be used for any controversial issue within diverse educational formats and levels.

Advertisements, in a sense, are the curriculum of everyday life. Individuals look at advertisements to learn

about new commodities, to learn about new product developments, and most importantly, to gain meaning about life. Advertisements are often images of lifestyles that portray "ordinary people" working, enjoying leisure time, etc. They are not only reflections of society, but they are also visions of what society can and should be.

Advertisements are inherently ideological. They provide a context of meaning for everyday decisions. Advertisements sell more than just a product, they convey a way of life. They project fundamental assumptions about political, economic, and social reality.

Moreover, in recent years, many corporations have constructed advertisements which explicitly convey their point of view on controversial political, social, and economic matters. These are called image advertisements and they are designed to promote good will, solicit trust, and to educate the public on the opinions of the corporation. Many of these advertisements address environmental/energy issues and were originally conceived as responses to the negative claims of environmentalists who have associated environmental deterioration with corporate natural resource management. This type of advertisement is especially useful for controversial issues education.

The ability to identify controversial issues in ideological text is a social theory interpretation skill,

that is, the ability to understand the explicit and implicit world assumptions that are prevalent in the symbols and text of everyday life. In conceiving the ads technique, the author has assumed that the development of social theory interpretation skills leads to improved critical thinking and greater awareness of political choices. As individuals improve these skills they are better able to understand the controversial issues in ideological content. With their ability to understand these controversies they develop the potential to clearly articulate political and economic alternatives. As they can articulate such choices, they develop the potential to act on those choices.

The author further assumes that social theory interpretation skills can be developed through appropriate teaching techniques. The long-range educational purpose of this ads technique is to model a process by which students can use critical thinking to undertake subjective analysis of the ideological content of everyday life. Issues advertisements are an interesting and powerful everyday life representation of ideological content. These advertisements contain complex controversial issues which are sometimes explicitly framed and othertimes implicit within the values assumptions inherent in the advertisements.

Research Methodology: Purpose and Parameters

The main purpose in experimenting with the ads technique is to consider its application as a controversial issues education teaching tool. However, this would entail a project of enormous scope as the ads technique could serve numerous curricular purposes. It could be implemented as a long term curriculum project or it could be used as a measuring yardstick to determine how different user groups identify controversy.

Thus its important to consider the guiding principles of the KNOW NUKES institute. An important problem that is often encountered with controversial issues teaching is that learners are so biased that they fail to agree on what is controversial and are unable to clearly articulate the various perspectives that comprise the controversy. One of the primary objectives of the institute has been to train participants to clearly identify controversy because that is a prerequisite for understanding the contrasting positions that arouse feelings about the issue. The clearest discourse and the greatest possibility for meaningful compromise arise when conflicting groups understand and legitimate those contrasting perspectives. This is best achieved when people with different perspectives can at least agree on what is controversial. Therefore, the main objective of the research

design is to use the ads technique to determine which controversial issues are identified by diverse user groups.

How can this inquiry be structured? The first methodological consideration determines what information should be gathered. The ads technique (see appendix) asks the user to provide information regarding:

(1) Identification of the single most important message the advertisement is trying to convey.

(2) How the advertisement deals with controversy (by acknowledging it, presenting an either/or position, by ignoring it).

(3) Identification of the most important controversial issues inherent in the advertisement.

Interpretation of the data is based on the juxtaposition of the independent variable (interest group representation) with the dependent variables (identification of advocacy message, how the ad deals with controversy, identification of controversial message).

A second methodological consideration is to determine the most relevant advertisement. The following criteria are necessary:

(1) The advertisement should deal with the nuclear power controversy in such a way that it will elicit strong opinions.

The nuclear power controversy is ideal subject matter not only because it is the subject of the KNOW NUKES institute but because inherent in the subject matter are

questions about economic growth, technological innovation, the scale of energy production, etc.

(2) The advertisement must be designed to deal with a controversial issue.

(3) The ad must contain ideologically implicit content.

By ideologically implicit content, I refer to assumptions which are not necessarily subject to conscious reflection by the designer of the advertisement or the reader of the ad. It will be interesting to determine whether the methodology helps users identify controversial subject matter that might not be readily apparent.

(4) The advertisement must be subject to different interpretations.

(5) The ad must have widespread media distribution.

It is important to choose an ad that has appeared widely in the national media. This is not to insure that it has been seen before as much as to insure its viability as everyday life content. It should be typical of what the participant might come across in a newspaper or magazine.

(6) The ad must be rich in symbolic content.

Most attractive ads use compelling symbols to gain the reader's attention. Ads of this sort will be more likely to engage the interest of participants in this project.

A third methodological consideration involves choosing the test groups. To determine the wider acceptability of the

technique as a public education tool for teaching about controversial issues, it is necessary to choose several interest groups, organizations, and groups of students that would either be likely to use the technique in their own work or would potentially be a target group for a controversial issues project. It is also important to choose a group that has an interest in the particular controversy dealt with in the advertisement.

The groups chosen for the experiment are listed below:

(1) Oakmont Regional High School (Ashburnham, Massachusetts) students from an environmental science class. (May, 1984)

(2) KNOW NUKES Institute participants. (July, 1984)

(3) New England Utility Educators (Boston, Massachusetts) at their annual business meeting. (April, 1984)

(4) Antioch/New England (Keene, New Hampshire) graduate students in Environmental Studies. (February, 1984; September, 1985).

(5) Keene State College (Keene, New Hampshire) students from an Introduction to Economics class. (April, 1984)

(6) Rotary Club (Keene, New Hampshire) weekly lunch meeting. (June, 1984)

The fourth methodological point is to describe in greater detail the advertisement chosen so as to indicate its relative suitability. The advertisement, The Electrical Age: Rebirth or Retreat? by the United States Committee for Energy Awareness acknowledges that there is a controversy about the role of electricity in America's future, but it

emphatically advocates the importance of energy development, placing special attention on the necessity of coal and nuclear energy. It clearly ignores the nuclear power controversy by failing to discuss any of the problems of nuclear power. It also ignores the environmental impacts of coal development. Although the ad emphasizes the importance of utilizing a variety of energy sources, it assumes that small-scale energy alternatives either don't generate sufficient electrical capacity or are technologically limited at the present time. The advertisement emphasizes the tremendous importance of electricity in maintaining American affluence, economic security, and international strength. It cites the potential dangers of energy dependence. It assumes that rapid energy development will revitalize the American economy. In advocating its position it glosses over numerous implicit controversial issues: whether rapid energy development is environmentally sound policy, whether technical innovation can solve all environmental problems, whether the affluent lifestyle is defined by unlimited material wealth.

The Educational Design of the Ads Technique

The ads technique has been designed so that it can be integrated in a variety of public education or classroom contexts. It can fit into a larger conceptual teaching unit

and it is flexible enough for various disciplinary implementations.

It is designed as a workbook-like, step-by-step approach that integrates inductive and deductive reasoning. It directs users to focus on specific aspects of an advertisement and to extrapolate observations and generalizations from personal interpretations. It encourages users to identify and interpret the relevant symbols and text in an advertisement, to systematize and organize the seminal symbols, and to analyze the controversial content of symbols and text.

It may be difficult for the user (depending on previous training) to detect implicit ideological content, but he/she should be able to recognize how symbolic content and text reflect particular world views or how they shape his/her vision of the world. However, even this is often a difficult conceptual leap. One must suppose minimum theoretical competence on the part of the user. Consequently the richness of the user's life experience must become the basis of his/her social theory interpretation skills.

The problem with any social theory interpretation process is validating subjective generalizations. How can the user know that he/she is effectively decoding symbolic content? This would assume a level of epistemological sophistication that is well beyond the scope of this project. That is why we emphasize the notion interpretation.

The user investigates the material so that it lends meaning to his/her life, so that he/she has a better understanding of the social world. Within the ideological content of the advertisement there are a range of interpretations. The best we can hope for is that the user can identify the controversial issues that are implicit and explicit in the advertisement and then understand the values dilemmas that comprise the controversy. The most optimistic hope is that the critical analysis introduced with the ads technique will then be applied to other text.

The ads technique leads the user through a path that emphasizes (1) the importance of one's emotional response to the ad; (2) interpretation of the emotional response; (3) an expansion of the personal interpretation leading to a more objective analysis of the ad; (4) identification of the advocacy message of the ad; (5) description of how the advertisement handles controversy; (6) identification of the most controversial issue in the ad; (7) an analysis of the values dilemmas that comprise the controversy; (8) how he/she feels about the controversy.

When used within a comprehensive curriculum, the ads technique is designed to help its users develop the following skills:

(1) To identify one's personal responses to the symbolic content of advertisements.

(2) To extrapolate social interpretations from personal observations of symbolic content.

(3) To analyze those interpretations and hypothesize general observations about the social world.

(4) To identify controversial issues as they are represented in advertisements and to clearly articulate the nature of the controversy.

(5) To understand the complexity of controversy.

(6) To clarify one's perspective about a controversial issue and to understand how acting on that perspective can help determine a future personal and social reality.

Methodological Limitations

There are several conceptual and mechanical limitations inherent in this research. Although the particular advertisement chosen may meet carefully considered criteria, it still is chosen from a universe of hundreds of issues advertisements. Other advertisements may work better or not as well as this one. Even if several different advertisements were used in this research the problem would still remain. How can we be sure that the ads technique isn't tailored to this particular advertisement? Pilot tests of the ads technique utilized ten different environmental issues advertisements. Moreover, the technique was designed by the author before he had any knowledge of the ad chosen for this research. Nevertheless it must be remembered that the research results will only be based on how different groups respond to one particular advertisement.

Second, the technique is tested somewhat out of context. It would typically be used within the framework of a more comprehensive controversial issues education program. This research cannot find out how effective the technique would be within context.

Third, some of the data will be qualitative and subject to some interpretive discretion on the part of the author. Although the technique is a fairly involved process, the experiment is designed to get specific information which for the most part is qualitatively described.

Fourth, the research methodology is not designed to determine whether the ads technique facilitates skill development. This is important information which might be the basis of further research but is well beyond the scope of this project. Rather, in this case, the technique is acting more as a gauge, or measuring instrument which indicates how different groups perceive similar content. We can only speculate regarding its potential for catalyzing skill development. However, implementation of the ads technique as a measuring instrument is helpful in facilitating controversial issues education because it will provide the experimenter with information regarding the perception of controversy.

C H A P T E R V I I

RESEARCH FINDINGS

Purpose

The purpose of this chapter is to present and analyze data collected as a result of the advertisements technique experiment. The data is evaluated so as to determine how different test groups identify an advocacy message, identify a controversial message, and describe how an advertisement handles controversy. Responses from the test groups are compared so as to determine how the ads technique reveals different or similar interpretations of controversy.

Methodological Considerations

The data is somewhat different for each section of this chapter. With the identification of the advocacy message, the respondent is free to describe the message as he/she chooses. Thus the respondent's answer is subject to the author's interpretation. In most cases this was not a problem as there were very few ambiguous responses. Each message was coded so that it could be placed in an appropriate category. The author's discretion is important here as a misreading of the message might place it in the

wrong category, or perhaps stereotype the message so that it's categorized inappropriately. In that there are 241 respondents, it is unlikely that such an arbitrary judgment could skew the total results. However, when the particular test group was small (18 Oakmont High School students) a misreading of the message could be significant.

This is compensated by condensing the eighteen (18) different advocacy message responses into six (6) generic groupings which are more likely to reveal trends and patterns in the responses. These groupings are described in greater detail below.

The same problem is evident for the identification of controversy. In this case, twenty-six (26) different controversial messages are organized into six (6) generic groups.

The section which analyzes how the advertisement deals with controversy asks the respondent to use number rankings, thus the only ambiguity lies in the respondent's interpretation of the questions. This issue is discussed in the appropriate section.

Test Groups

Although the data is not interpreted according to the demographics of the group, it is instructive to understand how the test groups are constituted. This will be helpful in

speculating about the test results and in considering the usefulness of the technique for controversial issues education.

The groups are briefly described below. In each case a code symbol is presented. The code is followed by the number of respondents and the average age of the group.

OAK (18, 16.5) Oakmont Regional High School, Ashburnham, MA

These were students in an environmental science class. The technique was used in April 1984 towards the end of the two semester course. The students were mainly juniors and seniors.

KN (28, 42) KNOW NUKES 1984 workshop participants, Keene, NH

The demographic profile of this group is described in detail in Chapter 4. The technique is used as the first activity during the first morning of the institute.

UE (29, 39.5) Northeast Utilities Educators, Boston, MA

Utility educators consist of individuals who work in public relations and/or education. The technique was distributed during their annual meeting in April 1984. Their meeting preceded the National Science Teachers Association Conference. Most of the utility educators were also attending that conference. The technique was disseminated in the middle of a series of business meetings. Seventeen (17)

of the respondents have college degrees, eleven (11) have Masters degrees, and one (1) has not advanced beyond high school.

MST (32, 31) Antioch/New England Environmental Studies graduate students who are candidates for the MST (Master of Science in Teaching) degree. Keene, NH.

The technique was used with the author's Political Economy of Environmental Issues classes in the FALL 1984 and SPRING 1985. In each case the technique is the first activity of the class. Students are asked to analyze the advertisement, which then serves as the introduction to some of the important issues covered in class. Most students are engaged in or aspire to careers as science teachers, interpretive naturalists, and/or environmental administrators.

KSC (67, 21) Keene State College students from an Introduction to Economics course. Keene, NH.

The technique was used towards the end of the semester (April 1984). The class is mixed (Freshmen 20, Sophomores 18, Juniors 19, Seniors 10). Most of the students aspire to careers in management or business. There were fifteen (15) management majors, thirteen (13) business majors. No other major had more than three (3) students.

ROT (67, 55) Keene Rotary Club, Keene, NH

The technique was used as part of a guest presentation during a weekly lunchtime meeting (June 1984). Thirty four (34) of the respondents had a college degree, thirteen (13) had masters degrees, six (6) had advanced professional degrees. The occupational breakdown was as follows: retired (14), administrators (9), executives (8), manufacturing (6), retail (6), insurance (4), law (3), banking (3), miscellaneous (14).

Identification of Advocacy Message: Charts and Tables

The respondents were asked to identify the three most important messages that the advertisement is trying to convey. Eighteen different advocacy messages were identified. These are listed in TABLE 2: ADVOCACY MESSAGE CODES. These messages can be categorized into six generic themes which facilitate the extrapolation of various trends and patterns. These themes are listed in TABLE 3: ADVOCACY MESSAGE THEMES. The identification of advocacy messages is compared between test groups. This is listed in TABLE 4: IDENTIFICATION OF ADVOCACY MESSAGE and TABLE 5: MOST COMMONLY CITED ADVOCACY MESSAGE. The identification of advocacy message according to themes is then compared between test groups. This is listed in TABLE 6: IDENTIFICATION OF ADVOCACY MESSAGE BY THEMES.

Table 2: Advocacy Message Codes

AE	Alternative energy sources are not feasible
CEA	What CEA is, importance of energy awareness
CN	Coal and nuclear the best energy options
CONS	The importance of conservation
EFF	Importance of efficient, clean energy use
EI	Necessity of energy independence
EN	The projected need, demand for electricity
F	Fossil fuels, other alternatives are finite
FS	Importance of a free society
I	The general importance of electricity
NU	The importance of nuclear energy
P	Planning for the energy future
PG	Progress and growth linked to abundant electricity
PL	Positive legislation necessary
PR	What are our electricity use priorities
Q	Electricity will insure affluence
U	Utilities are meeting energy demands
V	A variety of energy sources are needed

Table 3: Advocacy Message Themes

1. AE, CN, NU

COAL AND NUCLEAR ARE CLEARLY THE BEST ENERGY PATH

Alternative energy sources are not feasible
Coal and nuclear the best energy options
The importance of nuclear energy

2. CEA, U

PUBLIC AWARENESS ABOUT THE ROLE OF PUBLIC UTILITIES

What CEA is, importance of energy awareness
Utilities are meeting energy demands

3. CONS, F, P, V

IMPORTANCE OF A MIXED ENERGY FUTURE

The importance of conservation
Fossil fuels, other alternatives are finite
Planning for the energy future
A variety of energy sources are needed

4. I, PG, PR, Q

AFFLUENCE, GROWTH, ECONOMIC SECURITY

The general importance of electricity
Progress and growth linked to abundant energy
What are our electricity use priorities
Electricity will insure affluence

5. EI, FS, PL

POLITICAL ISSUES

Necessity of energy independence
Importance of a free society
Positive legislation necessary

6. EFF, EN

GROWING DEMAND FOR ELECTRICITY

Importance of efficient, clean energy use
The projected need, demand for electricity

Table 4: Identification of Advocacy Message

	OAK	KN	UE	MST	KSC	ROT	TOT
AE	0	3.5	3.6	3.3	0	3.2	2
AW	0	0	0	0	7	0	2
CEA	0	0	11	0	0	3.2	2
CN	24	50	46	47	21	23	32
CONS	29	11	18	10	25	18	19
EFF	12	3.5	7	16.7	10	10	10
EN	76	71	71	53	52	73	65
EI	0	0	0	0	0	0	1.6
FS	0	0	0	0	0	0	1.6
F	18	22	18	6.7	16	13	14
GOVT	0	0	0	0	2	1.6	1
I	12	25	43	43	38	18	30
NU	0	25	11	40	13	23	19
NPS	0	0	0	0	2	0	.5
P	18	21	3.6	23	7	5	11
PL	0	7	3.6	0	2	0	2
PR	0	0	0	0	2	0	.5
Q	0	3.5	0	13	15	1.6	7
U	0	3.5	7	0	0	0	1
V	35	14	18	3.3	30	18	20

Table 5: Most Commonly Cited Advocacy Message

OAK	EN	76
	V	35
	CONS	29
	CN	24
	P	24
KN	EN	71
	CN	50
	I	25
	NU	25
	F	22
UE	EN	71
	CN	46
	I	43
	CONS	18
	F	18
	V	18
MST	EN	53
	CN	47
	I	43
	NU	40
	PG	23
KSC	EN	52
	I	38
	V	30
	CONS	25
	CN	21
ROT	EN	73
	CN	23
	NU	23
	CONS	18
	I	18
	V	18
TOT	EN	65
	CN	32
	I	30
	V	20
	CONS	19
	NU	19

Table 6: Identification of Advocacy Message by Themes

	OAK	KN	UE	MST	KSC	ROT	TOT
1	10	32	22	33	15	23	22
2	0	1	7	0	0	2	1
3	43	14	24	10	32	26	25
4	12	20	17	29	26	11	20
5	0	3	1	4	1	1	1
6	36	29	29	25	27	38	31

Interpretation of Data: Identification of Advocacy Message

Respondents were asked to identify the most important message that the advertisement intends to convey. Although eighteen (18) different advocacy messages were identified, all of the groups identified EN (the projected need and demand for electricity) as the critical advocacy message. Within each group, more than half the respondents identified this message (52%-76%) as being most important.

Yet when the messages are grouped according to themes, a different pattern emerges. Rotarians and utility educators view theme 6 (growing demand for electricity) as most important, Oakmont and Keene State students identify theme 3 (importance of a mixed energy future); Antioch and KNOW NUKES identify theme 1 (coal and nuclear are the best energy path).

The advertisement uses a four step process in establishing its message. It underscores the nation's increasing electrical demand, it emphasizes the importance of a mixed energy future, it connects economic growth and affluence to energy security, and it describes the important role of coal and nuclear power in providing future energy needs. It doesn't differentiate these messages by placing them in a prioritized order. Rather the prioritization is left to the interpretation of the reader.

Why has the advocacy message been prioritized differently by the respondents? This can only be answered by speculation. Antioch and KNOW NUKES are more likely to be knowledgeable about the nuclear power controversy and perhaps to be more skeptical about the intent of the ad. They might be more likely to question the paradigmatic assumptions made by the ad. Oakmont and Keene State are more likely by virtue of their youth to read the ad literally and thus conclude that the ad emphasizes a mixed energy future. Rotarians are deeply ingrained in the business community and are likely to be concerned about electricity demand. It is the business of utility educators to be concerned about energy demand.

Despite these differences, it is clear that the advertisement successfully conveys the four messages cited above, especially the importance of America's growing demand for electricity.

Identification of Controversial Message: Charts and Tables

At the conclusion of the ads technique, the respondents are asked to list the three most important controversial issues that are inherent in the advertisement. Twenty-six different controversial issues were identified. These are listed in TABLE 7: CONTROVERSIAL MESSAGE CODES. These messages are further categorized into six generic themes which are listed in TABLE 8: CONTROVERSIAL MESSAGE THEMES. The twenty-six controversial messages are compared between test groups in TABLE 9: IDENTIFICATION OF CONTROVERSIAL MESSAGE and TABLE 10: MOST COMMONLY CITED CONTROVERSIAL MESSAGE. The generic themes are compared between test groups in TABLE 11: IDENTIFICATION OF CONTROVERSIAL MESSAGE BY THEMES.

Table 7: Controversial Message Codes

AR	Acid Rain
AE	Alternative energy
AW	Lack of public awareness of subject
B	What is the "best" energy source?
CN	Are coal and nuclear really the best options?
EC	Electricity costs
EF	Is our economic future improving?
EFF	Importance of efficient use of electricity
EI	Energy independence
ENV	Environmental impact issues
EN	Is there really a rising demand for electricity?
FF	Will we run out of fossil fuels?
GO	Depletion of gas, oil
GOVT	Can we trust the US government?
I	What about the importance of electricity?
INFO.	What about the information economy?
L	Do we want to lose energy intensive industries?
MT	What about mass transit?
NU	Is nuclear power needed?
NPS	Is nuclear power safe?
P	Have we adequately planned our energy future?
PG	Do we really need progress and growth?
Q	Quality of life, lifestyles, consumerism
V	A variety of energy sources are needed
W	Americans waste energy
WH	Who's in charge?

Table 8: Controversial Message Themes

1. AR, AE, ENV

ENVIRONMENTAL ISSUES, ENERGY ALTERNATIVES

Acid rain
Alternative energy
Environmental impact issues

2. CN, NU, NPS

THE NUCLEAR POWER CONTROVERSY

Are coal and nuclear really the best options?
Is nuclear power needed?
Is nuclear power safe?

3. I, PG, Q, W

PROGRESS, GROWTH, AFFLUENCE, ECONOMIC SECURITY

What about the importance of electricity?
Do we really need progress and growth?
Quality of life, lifestyles, consumerism
Americans waste energy

4. EN, FF, GO

AVAILABILITY OF NATURAL RESOURCES

Is there really a rising demand for electricity?
Will we run out of fossil fuel?
Depletion of oil, gas

5. B, EC, EFF, EF, EI, V

PLANNING AN EFFICIENT ENERGY FUTURE, ECONOMIC FUTURE

What is the "best" energy source?
Electricity costs
Importance of efficient use of electricity
Is our economic future improving?
Energy independence
A variety of energy sources are needed

6. AW, GOVT, INFO, WH

POLITICAL ISSUES

Lack of public awareness of subject
Can we trust the US government?
What about the emerging information economy?
Who's in charge of energy decision making?

Table 9: Identification of Controversial Message

	OAK	KN	UE	MST	KSC	ROT	TOT
AR	7	3.5	3.7	0	0	5	3
AE	13	14	15	19	27	16	19
AW	0	0	0	0	3	1.6	1
B	0	0	0	0	10	6	4
CN	27	43	48	26	13	18	25
CONS	27	11	3.7	3.2	13	26	15
EC	0	3.5	3.7	0	3	8	4
EF	0	3.5	3.7	3.2	0	3.2	2
EFF	0	0	0	0	8	0	2
EI	0	18	3.7	6	1.6	5	5
ENV	0	3.5	3.7	3.2	0	3.2	2
EN	47	57	78	45	37	47	49
FF	27	3.5	15	6	17	11	13
GO	7	0	0	0	0	0	.5
GOVT	0	3.5	7	3.2	0	0	2
I	7	3.5	15	16	17	6	12
INFO	0	3.5	0	3.2	0	0	1
L	0	3.5	15	3.2	6	0	4
MT	0	3.5	0	0	0	0	.5
NU	27	14	22	52	35	32	32
NPS	13	25	15	16	14	23	18
PG	0	14	3.7	16	11	5	9
P	0	11	0	0	10	11	7
Q	7	7	15	23	8	1.6	9
U	0	3.5	0	0	0	0	.5
W	7	0	0	0	0	0	.5
WH	0	0	0	0	1.6	0	.5
V	0	0	0	0	8	10	5

Table 10: Most Commonly Cited Controversial Message

OAK:	EN	47
	CN	27
	CONS	27
	FF	27
	NU	27
KN:	EN	57
	CN	43
	NPS	25
	EI	18
	AE	14
UE:	EN	78
	CN	48
	NU	22
MST:	NU	52
	EN	45
	CN	26
	Q	23
	AE	19
KSC	EN	37
	NU	35
	AE	27
	FF	17
	I	17
ROT	EN	47
	NU	32
	CONS	26
	NPS	23
	CN	18
TOT	EN	49
	NU	32
	CN	25
	AE	19
	NPS	18

Table 11: Identification of Controversial Message by Themes

	OAK	KN	UE	MST	KSC	ROT	TOT
1	10	10	9	9	12	12	12
2	34	37	35	39	29	37	35
3	7	11	14	23	17	7	13
4	41	27	38	22	26	29	29
5	0	13	5	4	14	15	10
6	7	3	0	3	2	1	2

Interpretation of Data: Identification of Controversial Issues

Although twenty-six (26) different controversial issues were identified in the advertisement, EN (Is there really a rising demand for electricity?) was widely identified by all groups except MST as the most controversial issue. MST identified NU (Is nuclear power needed?) as most controversial, with EN a close second (52%-45%).

However, when the issues are thematically grouped, theme 2 (the nuclear power controversy) is ranked most controversial (35%) with theme 4 (availability of natural resources) a close second (29%). Oakmont and Utility Educators ranked theme 4 as most controversial, Keene State ranked theme 2 first by a slim margin, KNOW NUKES and Rotary ranked theme 2 by a moderate margin, Antioch ranked theme 2 by a significant margin.

Once again, the consistency of the response is most striking. Antioch "environmentalists" emphasize the nuclear power controversy, but all the groups agree that themes 2 and 4 are most controversial. It is interesting to note that these controversies are most explicitly accessible. That is, once the respondent identifies the key advocacy message, he/she only has to frame that message with a question mark to arrive at the controversy.

The more difficult paradigmatic challenge lies in questioning the deeper assumptions of the ad; the relationship between economic growth, affluence, and technological progress. Only thirteen per cent (13%) of the total responses identified this theme (3). MST (23%) were most able to cite this issue, perhaps because environmentalists are more likely to reevaluate the growth paradigm, whereas Rotarians (7%) and Oakmont (7%) were least able to cite this issue. Rotarians are fully immersed in the benefits of the growth economy, Oakmont students may not be old enough to challenge ideological presuppositions.

How Controversial Issues are Portrayed in the Advertisement

The respondents are asked how the advertisement deals with what they indicated was its primary advocacy message. They are asked to evaluate on a one to five (1-5) scale,

with one highest and five lowest the extent to which the advertisement:

- alerts attention to the importance of the issue,
- alerts attention to the complexity of the issue,
- alerts attention to the controversy of the issue,
- states how the company feels about the issue,
- states what the company is doing about the issue,
- states what the company feels society should do about the issue.

They are then asked to make a judgment (by placing a check on a line) as to whether the advertisement ignores an important controversy, brings attention to a controversy by suggesting a compromise position, or represents the controversy as an either/or proposition.

Table 12: How the Advertisement Addresses the Advocacy Message

	OAK	KN	UE	MST	KSC	ROT	TOT
Importance	2.39	1.79	2.21	2.69	2.03	2.06	2.15
Complexity	3.61	2.82	2.39	3.78	2.91	2.80	2.98
Controversy	3.88	3.85	3.61	3.78	3.17	3.17	3.44
Company feels	2.89	2.93	2.89	2.38	2.74	2.95	2.80
Company doing	3.94	3.96	3.50	3.38	3.71	4.12	3.79
Society should	2.61	3.18	2.89	2.47	2.57	3.36	2.87

Table 13: How the Advertisement Deals with Controversy

	OAK	KN	UE	MST	KSC	ROT	TOT
Ignores	33	64	39	59	24	27	37
Compromise	28	18	25	13	42	46	33
Either/Or	29	18	25	28	34	27	29
No controversy	0	0	11	0	0	0	1

Interpretation of Data: Dealing with Controversy

The respondents agree that the advertisers are most interested in emphasizing the importance of the issue (2.15), that the advertisement does not alert the reader's attention to the controversial aspects of the issue (3.44), nor does it describe what the advertiser is actually doing about the issue (3.79). The MST students cite the advertiser's role as advocate, as "company feels" (2.38) and "society should" (2.47) take precedence over "importance" (2.69). Utility educators believe that the ad emphasizes the complexity of the issue (2.39) as compared to MST (3.78) and Oakmont (3.61) which rank complexity considerably higher. Otherwise the interpretations are remarkably similar.

MST students, perhaps by virtue of their strong environmentalism view the ad skeptically, and assume that the advertiser is merely advocating a pro-nuclear perspective. Utility educators, many of whom work for utilities that operate nuclear power plants and coal

facilities are more likely to agree with the perspective of the ad, perhaps explaining why they feel the ad represents the issue in its complexity. Surprisingly, utility educators are aware that the ad does not address controversy (3.61).

This interpretation is reinforced by TABLE 13. By a significant margin KNOW NUKES teachers (64-18-18) and MST students (59-13-28) believe that the ad ignores controversy. Utility educators (39-25-25) agree as do Oakmont students (33-28-29), although by a moderate margin. The most glaring discrepancy in this table is that a significant minority of Rotarians (27-46-27) and Keene State college students (24-42-34) agree on this point. This is understandable in the case of the Rotarians who might be less willing to question the conclusions of the ad, but difficult to explain for the Keene State College students.

Conclusions

The data indicate that the advertisements technique serves as an effective instrument for identifying particular content in issues advertisements. The test groups, which represent a wide variety of interests, ages, professions, educational levels, experience with energy issues, and ideological predispositions displayed similar interpretations in terms of their identification of the advocacy message, identification of controversial message, and how the ad deals with controversy. Although there were

occasional differences between groups, these were not significant enough to question the validity of the instrument.

Further Research and Applications

A difficulty with the advertisements technique is that it was designed to serve two purposes, to work as an instrument in identifying controversy and to work as a curriculum which teaches students how to analyze advertisements.

To more completely evaluate its effectiveness as a research instrument it would be necessary to test its use with a range of advertisements and a larger number of test groups. It would provide more precise data if the respondent had a choice of issues to identify, thus expediting tabulation and avoiding the ambiguities of the qualitative response. Nevertheless, even with the limited information provided by this experiment, it can be concluded that the advertiser has clearly communicated its intended message. There was absolute clarity regarding what the main points of the advertisement are supposed to be. An interesting research project would involve additional refinement of the test instrument and subsequent analysis of a series of issues advertisements.

The limited research described above does not attempt to evaluate the technique as curriculum although the author

has several informal observations in that regard. The advertisements technique should serve to facilitate critical thinking about contemporary issues. This is not something that can be accomplished during a forty-five minute one-shot deal. Instead the technique should be used over a longer stretch of time (several periods in the public school classroom, a longer seminar period for college students, etc.) so that students and teacher have an opportunity to fully explore and develop the various concepts inherent in the curriculum. The author, in his Political Economy of Environmental Issues class at Antioch/New England uses the technique as part of a three hour session that investigates environmental issues advertisements. Students use the ads technique as a basic introduction. The activity is then followed with groups of four students working together, without the technique, to analyze a different advertisement. Their task is to report on their investigation and prepare a summary for the rest of the class. This approach encourages the student to actively participate in the ads analysis. By the end of the class the range of contemporary environmental controversy has been articulated and students are prepared to study the controversies in greater depth.

For a controversial issues education program, i.e., the KNOW NUKES institute, the technique is effective as a table setter. That is, it enables a group to agree as to what is controversial and then to analyze the values

perspectives that comprise the controversy. Eventually the students understand the different world views (cognitive perspective taking) that account for different opinions.

The ads technique does not work well as an instructional method when it is used out of context in formal or informal educational settings. It should be further developed both as a measuring instrument and as a formal curriculum. It can be effective in both contexts but should be differentiated so it can more effectively serve either purpose.

C H A P T E R V I I I

FURTHER THOUGHTS ON CONTROVERSIAL ISSUES EDUCATION

Introduction

The ultimate test of the KNOW NUKES model is the feasibility of its implementation. Several questions should be raised about the model. Does it provide teachers with a range of new techniques that can be effective in the classroom? Does it provide teachers with the impetus to reevaluate their approach to teaching? Does it have a place within the context of the so-called "great school debate" (Gross and Gross, 1985)? Does it generate interest beyond the scope of the classroom? Is the model applicable to other controversial issues content areas? These questions will provide the basis for the author's speculation regarding the ultimate impact of KNOW NUKES.

Controversial issues education will not save American schools, nor will it be overwhelmed by the morass of educational problems currently facing the schools. This is important to keep in mind for any discussion regarding impact. It is dangerous to be swept away by the momentum, or even myopia, of the hard work that one gives to a subject. By the same token, it is easy to be overwhelmed by the relative insignificance of one small piece of work in the

universe of educational environments. Hopefully the following comments are tempered by the reality of real work. That is, you place maximum effort and passion into your professional endeavors, understanding that you cannot completely evaluate the impact of your efforts. The tangible results of educational practice are often incremental, and realistically occur in ways that are sometimes observable but in some cases hidden, obscure, yet every bit as meaningful. That philosophy guides the following comments.

Impact on Teachers: Change in the Classroom

Between KNOW NUKES summer institutes (80 participants) and KNOW NUKES one day workshops (approximately 300 participants), a good number of educators have been exposed to the KNOW NUKES model, albeit at different levels of intensity. We can conclude from the attendance for the project that many New England teachers are interested in the controversial issues approach to nuclear power education. Some teachers attend because of their interest in nuclear power, feeling that their previous exposure to nuclear power education is typically biased and lacking credibility. Others attend because of a generic interest in controversial issues education, feeling they would like to learn some educational methodologies and teaching techniques.

Nevertheless, KNOW NUKES attendees are a self-selected group. To recruit for the summer workshops, brochures are sent to 3,000 science teachers in the New England region. Approximately 45 teachers from this group apply to the workshop, a 1.5% rate of return. One day workshop attendees have less at stake. They may be deeply interested in the KNOW NUKES ideas, but they also may come out of curiosity, or perhaps a vague interest in the subject matter. Although the 1.5% return rate is standard for any direct mailing recruitment process, it seems like a disappointingly small number of applicants. Perhaps nuclear power is too distressing a subject for some, perhaps some teachers are hesitant to introduce controversy in the classroom. Yet the project has sustained enough interest over several years to continuosly generate more applications than it can accept.

Why do teachers attend the two week institute? The majority of teachers are sincerely interested in implementing new and innovative curriculum ideas as an approach to effective science teaching. Many are looking to regenerate their interest in teaching; some desire support for the kind of work they do anyway; others would like to study the controversial issues approach in detail. A minority of teachers say they come exclusively for the technical information, even though the recruitment brochure clearly states that the project emphasizes CIE as well as

technical information. These teachers are often looking for new curriculum ideas but are unwilling to explicitly say so.

The two week institute is utopian in many respects. In other words, support for educational innovation is cultivated; the workshop isn't divided into forty-five minute periods, teachers are working with colleagues rather than their own students. The instructors emphasize how they wish to model the process of CIE, that is, through the structure of the program, participants will realize the value of the educational methodology. But can the methodologies in fact be applied in real world classrooms?

For most teachers, the critical problem is not a fear of incorporating controversy in the classroom. Rather the problem is how they can fit nuclear power education into an already jam-packed curriculum. Most science departments have very specific curriculum agendas which have minimum flexibility. How can several weeks be spent on nuclear power when there isn't enough time to cover the material that's supposed to be covered? Moreover, how can we convince colleagues and community members that the CIE approach facilitates skill development, when the current school atmosphere encourages back-to-basics?

Is this a legitimate problem or is it an excuse? This is an important question because "tight curriculum" is the major implementation problem that is cited by many teachers. To some extent this is an excuse. Some teachers who are used

to a traditional lecture/lab teaching approach do not have the confidence to incorporate new ideas. They are unwilling to risk valuable class time when they feel the traditional approach is best. Surprisingly, this is frequently the case with less experienced teachers who are not as sure of themselves in the classroom. For some teachers, of course, this is a legitimate problem. A department head will be breathing down their back, wondering why they are varying from the "approved" curriculum.

For many teachers, perhaps half, this is not a problem. They have the flexibility to incorporate from two to four weeks worth of KNOW NUKES work in their classroom. They are willing to experiment with their approach to teaching science and they have confidence that CIE will facilitate critical thinking and the learning of technical information. These are the teachers who are most likely to reevaluate their entire curriculum and make significant changes.

Although the KNOW NUKES institute is willing to work with both types of teachers, typically we concentrate on the teacher who will be a role model, one who can effectively incorporate CIE so that other teachers can see the value of the approach. These teachers come from both categories described above. Some teachers who are worried about restrictions make careful and sincere efforts to try three to five days worth of KNOW NUKES curriculum. The KNOW NUKES

staff encourages this approach, utilizing the "journey of a thousand miles starts with a single step" adage. These teachers receive staff support and, in some cases, site visits. Participating teachers also have letters sent to their supervising principal, explaining their work in the KNOW NUKES institute. This often adds to the credibility of their participation.

A common pitfall of federally funded grants is that the project ends when the grant is over. KNOW NUKES has been fortunate to receive renewed funding and to generate additional funding from several sources (book sales, private sector). This additional funding has been used to make KNOW NUKES on-going. There is a KNOW NUKES newsletter with contributions from teachers and a KNOW NUKES reunion in which teachers discuss their implementation experience. This maintains the reality of CIE, and prevents the project from existing merely as a summer utopia.

There are specific curriculum ideas which have been particularly successful. The problem-solving curriculum, which uses moral dilemmas or policy problems as a means to motivate the search for technical information have been most commonly implemented. Kurt's Dilemma and the Indian Point Simulation (see Chapter 5) are popular and apparently generate high quality work from the high school students.

The teachers are encouraged to use these curriculum ideas as the basis for their own curriculum which might be used in other subject areas.

The 1985 KNOW NUKES institute dealt extensively with bias and propaganda. This was extremely well received as many teachers are intending to have their students analyze advertisements, science texts, and popular media to determine their propaganda content. Many teachers indicated that their students are so easily influenced by popular media that they have distorted views on contemporary issues. The KNOW NUKES staff will closely watch the implementation of this material as it seems to be designed flexibly enough to fit into even the most restricted curriculum structures.

Implementation of CIE is a difficult process that requires commitment from both participating teachers and teacher trainers. Once the glamour of a summer institute wears off, the trench work begins. The impact of the KNOW NUKES model will depend on the perseverance of its staff as well as the flexibility of its participants.

What about its impact on students? If one assumes that each teacher has approximately 120 students per year, and if one assumes that 80 participating teachers all use some aspect of KNOW NUKES at some point in their classes, then 9,600 students per year are exposed to controversial issues education. This is a superficial calculation because the impact on each student will be markedly different. If one

assumes that even 20% of the participating teachers effectively implement the KNOW NUKES curriculum, then approximately 2,000 students are using this approach.

Impact on Schools: Towards Scientific Literacy

Within the last several years, scores of studies have been released examining the quality of American schools. These studies are described in a report by the Northeast Regional Exchange (1985). Significant attention has been focused on the poor quality of science education. The fear is that Americans are ill prepared for the technologically sophisticated world that represents the workplace of the future. The National Science Foundation has a greatly expanded budget designed to fund teacher training programs to promote improved science teaching, technological literacy, and professional development for science teachers. In fact, that NSF source represents the major funding for KNOW NUKES.

Concerns of this sort are hardly new. Ravitch (1983) describes the resurgence of science education in the 1950's and 1960's. In 1957, after the Russians launched Sputnik, a renewed emphasis was placed on science education. In the 1960's, many new science curricula were developed, many of them modelled on the investigative, problem-solving approach to learning. And now, no less an authority than the National Commission on Excellence in Education report A Nation at

Risk (1984) emphasizes, among pages of recommendations, that science in high school should provide graduates with an introduction to "the application of scientific knowledge to everyday life" ... and "the social and environmental implications of scientific and technological development."

From this perspective, controversial issues education has a role in the great school debate. There is a renewed interest in critical thinking, an emphasis on the practical applications of learning science, and a concern that American citizens must be a technologically informed population. The KNOW NUKES model covers all of these concerns.

It is essential that the renewed interest in science education is global enough to encompass social issues. Part of the rationale for increased science education funding was the perspective among many members of Congress that a poorly trained pool of students would hinder America's ability to compete technologically with other nations. Thus science education becomes linked to national security. That may be the best way to get federal funding in the 1980's, thus creating an interesting tactical logic for improving our nation's schools. Regardless of the intent of the legislation, this new "science education consciousness" opens the doors for controversial issues education. The KNOW NUKES model emphasizes the importance of both technical information and participatory decision-making. Let's have an

informed electorate that understands several perspectives on emerging contemporary issues.

Hence CIE enters the great school debate through the back door. The "back-to-basics" budget cutting 1980's will not support controversial curriculum unless its grounded in the language of scientific and technological literacy. That has been the strategy of KNOW NUKES. Both advocates and critics of nuclear power agree that the American public does not understand the technical aspects of nuclear power generation. Nuclear utilities believe that once the public understands this mysterious, complex technology, it will recognize that it is safe and necessary. Nuclear power critics believe that once the public is nuclear power literate, it will recognize the extraordinary safety hazards posed by nuclear energy. Thus both groups can support a project such as KNOW NUKES. At least their public rhetoric claims that a well-informed public will make good decisions.

The long range strategy of the KNOW NUKES institute is to expand the range of its efforts so that it becomes an Institute for Controversial Issues Education, developing training models and curriculum for a variety of emerging contemporary issues in science and technology. The generic model that has been used for nuclear power can be used for numerous other issues. The basic objectives and criteria described in this dissertation should theoretically be applicable to other issues. This dissertation has elaborated

the model in detail so that its impact can be targeted beyond just the nuclear power controversy. In the section on further research, some appropriate new projects will be suggested.

Impact on the Community: Education as News

One of the interesting sidelights of the KNOW NUKES experience has been the remarkable press attention that the project received. In addition to the routine local (Keene, NH) coverage, KNOW NUKES was covered extensively by the regional and national media. Newspaper coverage has included the Christian Science Monitor and the Boston Globe; radio coverage has included National Public Radio (All Things Considered, Morning Edition), ABC radio network news, local public radio (WEVO; Concord, NH); several New Hampshire television stations covered the project, and the story was picked up by the wire services.

To a certain extent, such coverage is an ephemeral honor. Once the excitement of numerous interviews and publicity fades away, one wonders whether it all means anything, i.e., does such coverage mean the project has additional public impact? KNOW NUKES has received some inquiries from individuals who have heard about the project through the national media coverage, but that doesn't amount to a measurable impact. More importantly, it is interesting to consider why the project received coverage. It wasn't

only because of the big name speakers; it wasn't only because of a well planned press campaign. The media determined KNOW NUKES to be of sufficient public interest because it was an unusual educational event. The interesting story is that people on different sides of the issue are working together. What an interesting way for high school science teachers to be spending their time.

This media coverage further legitimates the importance of the project to the participants, it furthers the cause of controversial issues education, and it lends a "real world" excitement to the learning process. It also indicates that the media is interested in public education that concentrates on contemporary issues.

Another successful aspect of KNOW NUKES appeal has been the willingness of prominent scientists and policymakers to address the institute. Three different nuclear regulatory commissioners have taken time out of their hectic schedules to visit rural New Hampshire. Commissioner James Asselstine has twice attended the institute out of a sense that citizen access to nuclear regulation policy is essential. This also creates legitimacy and credibility for the institute as well as the host institution, but more importantly, it engages prominent public figures in grassroots education about nuclear power. Commissioner Asselstine, for example, is now a believer in the virtues of the KNOW NUKES model. He has served as a role

model, reaffirming the importance of science education. This is an example of an intangible, yet real impact, that cannot be measured, but represents excellent support for CIE.

Ideas for Further Research

This dissertation has been designed as a descriptive discussion of the KNOW NUKES model. It raises numerous research questions for the investigator who wishes to quantify the impact of the training model and the teaching techniques.

The most obvious research would involve a pre and post test of the KNOW NUKES participants. How does the institute improve their knowledge of nuclear power? Do they have different ideas about how to teach controversy? Are they more willing to listen to diverse perspectives? Are they more able to analyze bias and propaganda? Are they more able to integrate innovative educational techniques in their classrooms? Any of these questions could become the basis of a fairly involved study that could conceivably be run over a several year period. Does the teacher's initial enthusiasm diminish over three years? What are the classroom factors that inhibit or facilitate the KNOW NUKES teaching techniques? Does the teacher influence other teachers in his/her school district?

It would also be interesting to find out whether KNOW NUKES causes attitudinal change about nuclear power. Does

the teacher's perspective on nuclear power change as a result of the institute? Do the teacher's students change their attitudes as a consequence of the KNOW NUKES curriculum? Do the planning members of the project change their perspective? Are their stereotypes of their opponents changed?

Finally, the two KNOW NUKES curriculum guides could be more fully analyzed. Does controversial issues education, as practiced through use of the KNOW NUKES curriculum guides facilitate critical thinking, cognitive perspective-taking, the ability to learn technical information, etc.?

New Project Directions

As previously mentioned, the most intriguing area opened up by the KNOW NUKES model is the potential application of the model to other content areas. The author assumes that the generic model described in this dissertation is easily applied to other emerging contemporary issues in science and technology. The most immediate prospect will be a project in genetic engineering, for which funding will be sought for the summer of 1986. Controversies about bioethics and the application of genetic research raise numerous moral questions ranging from the appropriate treatment of disease to fundamental life and death questions. The field of genetic engineering is extremely controversial and certainly deserving of a more

informed citizenry. Moreover, genetics is commonly taught in general science and high school biology classes and would represent even less of an implementation problem than nuclear power. On the other hand genetic engineering may raise moral questions that might more quickly garner the attention, if not ire, of the school and community.

Other suitable subjects for CIE include land use planning, toxic waste management, acid rain, computers and society, mass communications, etc. Ideally, other institutions would be compelled to run these projects. Another long range goal of the KNOW NUKES staff is to publish a series of controversial issues curriculum guides for a host of contemporary issues.

Federal funding for controversial issues is essential. It legitimates its importance, and it provides the real dollars necessary for the work. However, reliance on federal funding is typically the death knell of innovative education. The whims of funding agencies are difficult to predict, and if they are the sole basis of funding, when the funds dry up, the project dies. Thus KNOW NUKES has sought to diversify its financial base by relying on book sales, money from the private sector, and support from host institutions.

Nevertheless, the lesson of the 1980's is that innovative education is financially fragile and a critical aspect of project leadership is to maintain a viable source

of support which can be translated into funding. Thus community building, coalition building, and public relations are necessary for a project to maintain its viability. Perhaps the most important lesson of this dissertation is that the community of controversy builds coalitions between industry, the state, the university, and the public school that can result in interesting educational partnerships. The controversial issues educator must be active in the community as well as in the school. He/she must be able to describe the educational benefits of the CIE approach. Hopefully the KNOW NUKES model will demonstrate that such efforts can succeed.

REFERENCES

Armstrong, J. (1982). Why teach about nuclear power. Bulletin of Environmental Education, 138, 5-9.

Apple, Michael (1979). Ideology and curriculum. Boston: Routledge and Kegan Paul.

Bennett, J.R. (1978). How to defend ourselves against corporate image and ideology advertising. (ERIC Document Reproduction service No. ED 159728)

Bennis, Warren G. and Shephard, Herbert A. (1956). A theory of group development. Human Relations, 9, 415-437.

Berman, R. (1981). Advertising and social change. Beverly Hills: Sage.

Butterfield, Charles H. (1983) Values and biology. Portland, Maine: J. Weston Walsh.

Cappelluzzo, E. (1979). Nuclear power and educational responsibilities. Phi Delta Kappan, 61, 47-49.

Coser, Lewis (1956). The functions of social conflict. Glencoe, Illinois: The Free Press.

Dewey, J. (1933). How we think, Boston: Heath.

Dyer, G. (1982). Advertising as communication. New York: Methuen.

Educators for Social Responsibility. (1983). Perspectives: a teaching guide to concepts of peace. Cambridge, MA: Author.

Esposito, F. (1969). Controversy- the issues that must be explored. Social Studies, 60, 307-310.

Ewen, S. (1976). Captains of consciousness. New York: Methuen.

Gallagher, Dan (1984). Using taking sides in the classroom. Guilford, Connecticut: Duskin Publishing Group.

Gitlin, Todd (1980). The whole world is watching. Berkeley, California: University of California Press.

Goldstein, W. (1980). Controversial issues in our schools (Fastback 146). Bloomington, IN: Phi Delta Kappan Educational foundation.

Gross, Beatrice and Ronald (1985). The great school debate. New York City: Simon and Schuster.

Harty, Sheila (1979). Hucksters in the clasroom. Washington: Center for the Study of Responsive Law.

Intermountain Science Experience Center. (1980). Citizen education on nuclear technology (Report No. Intersec-80-1A). Idaho Falls, Idaho. (ERIC Document Reproduction Service No. ED 200396).

Johnson, D.W., and Johnson, F.P. (1982) Joining together. Englewood Cliffs, New Jersey: Prentice Hall.

Johnson, D.W., Johnson, F.P., and Johnson, R.T. (1976). Promoting constructive conflict. Education Digest, 42, 46-48.

Johnson, D.W. and Johnson, R.T. (1979). Conflict in the classroom: controversy and learning. Review of Educational Research, 49, 51-70.

Kelly, M.G. and Gross, R.E. (1981). Controversy and social studies textbooks- a model code. Social Studies, 72, 61-64.

King, David C. (1984). Re-tooling the social studies textbook. Educational Leadership, 42, 65-68.

Kupperman, Joel J. (1984). Why some topics are controversial. Educational Leadership, 42, 73-76.

Lagana, J.F. (1972). Controversial issues and materials can minimize conflict. Educational Leadership, 30, 23-25.

Lai, M.K., Gall, M.D., Elder, R.A., and Weathersby, R. (1973). Main field test report. Discussing controversial issues. San Francisco: Far West Lab for Educational Research and Development. (ERIC Document Reproduction Service No. ED 093925)

League of Women Voters Education Fund. (1981). Taking nuclear issues to the village square: A guide for community leaders. Washington: Author.

Massialas, B.G. (1975). The roots of controversy. Educational Leadership, 33, 6-10.

Meadow, R.G. (1981). The political dimensions of non-product advertising. Journal of Communication, 31, 69-83.

Molnar, Alex (1984). Old friends: controversy and the public schools. Educational Leadership, 42, 60-61.

Muessig, R.H., (Ed.). (1975). Controversial issues in the social studies: a contemporary perspective. Washington: National Council for the Social Studies.

National Commission on Excellence in Education (1985). A nation at risk. In Beatrice and Ronald Gross (Eds.), The great school debate (pp. 23-50). New York City: Simon and Schuster.

National Education Association. (1983). Choices: A Curriculum on conflict and nuclear war. Washington: Author.

National Institute for Education. (1977). Controversial issues in social studies. Description of teacher inservice education materials. (Report No. BBBO6621. Washington. (ERIC Document Reproduction Service No. ED 169061)

National Science Foundation. (1983). A revised and intensified science and technology curriculum grades K-12 urgently needed for our future. Washington: Author.

Newmann, Fred M., Bertocci, Thomas A. and Landness, Ruthanne M. (1977). Skills in citizen action. Madison, Wisconsin: University of Wisconsin Publications.

Newmann, Fred M. and Oliver, Donald W. (1970). Clarifying public controversy. Boston: Little, Brown, and Company.

Newton, D.E. (1983). Science and social issues. Portland, Maine: J. Weston Walsh.

Northeast Regional Exchange. (1985). The national reports on education: a comparative analysis. In Beatrice and Ronald Gross (eds.), The great school debate (pp. 50-73). New York City: Simon and Schuster.

Oliver, D.W. and Shaver, J.P. (1966). Teaching public issues in the high school. Boston: Houghton Mifflin.

Olmann, R. (1976). Teaching about doublespeak. Urbana, Illinois: National Council for the Teaching of English.

Ravitch, D. (1983). The troubled crusade. New York City: Basic Books.

Roy, R. (1985). The science/technology/society connection. Curriculum Review, 24, 12-16.

Schug, M.C. (1984). Resources on controversy in the classroom. Educational Leadership, 42, 77-78.

Shaver, J.P. (1971). Controversial issues, teaching of. In Len Deighton (Ed.), The encyclopedia of education. New York: Macmillan

Shillenn, J.K. and Vincenti, J.R. (1981). Nuclear power in the classroom: A union of science and social studies education. (ERIC Document Reproduction Service No. ED 1219327).

Staff. (1983, Winter). Three mile island. ACCORD works to involve the public. ACCORD, p. 1, (may be obtained from ACCORD, 5500 Central Avenue, Boulder, CO 80301).

Tanner, T. (1976). Of democracy, truth, and courage. New York City: National Audubon Society.

Tanner, T. (1979). The China Syndrome as a teaching tool. Phi Delta Kappan, 58, 708-712.

Thomashow, Mitchell and Sobel, David (Eds.), KNOW NUKES: A nuclear power issues curriculum project. Keene, NH: Antioch/New England Graduate School.

United States Department of Energy. (1981). Directory of faculty development projects in energy education-1981. Washington: Author, Division of University and Industry Programs.

Williamson, J.W. (1978). Decoding advertisements, Boston: Marion Boyars.

APPENDIX A: EVALUATION FORMS AND DATA

GENERAL EVALUATION

ANTIOCH/NEW ENGLAND GRADUATE SCHOOL

KNOW NUKES INSTITUTE (KNI)

July 8-20, 1984

The purpose of this questionnaire is to obtain your evaluation of the workshop that you have attended.

PLEASE PLACE THE NUMBER CORRESPONDING TO YOUR RESPONSE IN THE SIDE COLUMN.

1. Your main objective in attending the workshop was to: 1. ____
   (1) Obtain materials for use in teaching or energy education projects.
   (2) Increase your knowledge of energy resources and energy problems.
   (3) Obtain information to use in teaching or energy education projects.
   (4) Interact with other teachers.
   (5) Obtain graduate credit.
   (6) Other _____

2. The extent to which you achieved your objective was: 2. ____

1	2	3	4	5
Achievement plus unexpected benefits	Achievement	Partial Achievement	Somewhat Unsatisfactory	Failure

3. CONTENT: The majority of the material covered introduced concepts that increased my knowledge substantially. 3. ____

1	2	3	4	5
Strongly Agree	Agree Somewhat	Neither agree nor Disagree	Disagree Somewhat	Strongly Disagree

4. Where controversial national issues were presented, both sides of the issue were given a fair hearing. 4. ____

1	2	3	4	5
Strongly Agree	Agree Somewhat	Neither agree nor Disagree	Disagree Somewhat	Strongly Disagree

5. The level of presentations was: 5. ____

1	2	3	4	5
Far too Advanced	Advanced	About Right	Simplified	Far too Simplified

6. Resource Materials - were they an aid to your comprehension of workshop presentations? 6.(a) ____

(a) 1. Yes 2. No (b) ____

(b) 1. Too many? 2. Too Few? 3. About right. (c) ____

(c) Will they be used in your classroom?

1. Yes 2. No

---

7. The workshop provided an opportunity for participants to describe own work and learn from other participants. 7. ____

1	2	3	4	5
Sufficiently Plus	Adequately	Sometimes	Seldom	Never

8. The workshop as a whole provided information and experience that was applicable to my teaching. 8. ____

1	2	3	4	5
Strongly Agree	Agree Somewhat	Neither agree nor Disagree	Disagree Somewhat	Strongly Disagree

9. In your opinion, what is the probability of significant long term benefits to your teaching as a result of this workshop? 9. ____

1	2	3	4	5
Very High	High	Medium	Low	Minimal

---

10. Has the workshop changed your attitude about energy education? 10. ____

(1) Yes, I now believe it is important to teach energy related topics.
(2) No, I do not believe it is important to teach energy related topics.
(3) I previously believed energy education was important, and still do.

LECTURE, PRESENTATION EVALUATION SHEET (1984)

		Challenging	Interesting	Informative
1.	Nuclear fuel cycle Q@A (Thompson)	2.50	2.27	2.04
2.	How nuclear plants work (Thompson)	2.42	2.12	1.85
3.	Radiation and Life (Lowell staff)	1.72	1.65	1.64
4.	Reactor Tour	2.17	1.31	1.37
5.	Radiation standards (Hertzberg)	2.04	1.92	1.73
6.	Radiation standards (Maletskos)	2.21	1.96	1.70
7.	Bias and propaganda (Berman)	2.38	1.96	2.00
8.	Alternative fission reactor designs (Martocci)	2.25	1.84	1.73
9.	Capsule history of NRC (Asselstine)	2.00	1.43	1.54
10.	Reactor safety lectures (Thompson)	2.17	2.04	1.83
11.	Reactor safety lectures (Adelson)	1.96	1.71	1.80
12.	Q@A with Asselstine	2.04	1.58	1.50
13.	Seabrook Station Tour	2.39	1.36	1.62
14.	Lovins on the Soft Path	2.75	2.11	2.40
15.	Seabrook economics (Stone)	2.38	1.96	1.76
16.	Radioactive waste (Schori)	2.29	1.81	1.73
17.	Learning Theory and Nuclear Power Ed. (Sobel)	2.17	1.96	1.85
18.	Nuclear power/weapons? (Freeman)	2.38	2.08	1.84
19.	Lovejoy's nuclear war	2.87	2.12	2.20

RATE THE EXERCISE EVALUATION SHEET (1984)

	Challenging	Interesting	Replicable
1. Interpreting advertisements	1.80	1.70	1.59
2. Nuclear Fuel cycle drawings	2.08	1.96	1.44
3. Nuclear reactor coloring	2.72	2.31	1.67
4. China Syndrome interpretation	2.30	1.78	2.13
5. Lowell experiments	1.88	2.15	3.08
6. Discussion: Why Cont. Issues are important, etc.	1.91	1.50	1.67
7. Moral dilemma: radiation and health	1.80	1.46	1.37
8. Believing methodology	2.48	2.44	2.46
9. Radiation films propaganda analysis	1.96	1.73	1.52
10. TMI simulation	1.23	1.48	1.88
11. Collective question formulation	2.39	2.08	1.73
12. Indian Point hearing	1.35	1.20	1.29
13. Personal impressions of Seabrook discussion	2.50	1.93	2.00
14. Quantitative exercises for classroom use	1.76	1.92	1.81
15. Values activity: Buying a house near a nuke?	2.67	1.85	1.30

RATE THE PRESENTATION EVALUATION SHEET (1985)

		Challenging	Interesting	Informative	Total
1.	Goals and objectives	2.61	2.10	1.72	2.16
2.	"Toast"	3.12	2.00	2.50	2.51
3.	Magic markers (MT)	2.93	2.37	2.90	2.73
4.	How nuclear plants work (BM)	2.15	1.45	1.34	1.63
5.	China Syndrome interpretation	2.60	1.86	2.00	2.13
6.	Radiation and health (Jack Luskin)	2.04	1.97	1.67	1.88
7.	Lowell Reactor tour	2.12	1.60	1.72	1.80
8.	Lecture on bias and propaganda (MT)	1.74	1.27	1.50	1.49
9.	Radiation and health (Hull)	2.03	2.03	1.87	1.98
10.	Radiation and health (Schoff)	2.71	2.63	2.24	2.52
11.	What happened at TMI (Thompson)	1.96	1.77	1.43	1.71
12.	Capsule history of nuke regulation (Asselstine)	2.11	1.70	1.47	1.75
13.	Nuke safety (Grossman)	2.61	1.83	2.57	2.33
14.	Nuke safety (Strauss)	2.27	2.00	2.20	2.15
15.	Current issues in nuke regulation (Asselstine)	2.11	1.70	1.53	1.77
16.	Seabrook intro (Sher)	2.80	2.20	2.07	2.33
17.	Economic growth, tech. optimism as underlying paradigms (MT)	2.40	2.11	2.07	2.19
18.	Seabrook Economics (Sher)	2.41	2.27	2.07	2.24
19.	Seabrook Economics (Stone)	2.33	1.97	1.97	2.08
20.	Radioactive waste (BM)	2.22	1.66	1.57	1.80
21.	"Lovins on the soft path"	2.62	2.20	2.31	2.36
22.	"Electricity for all"	2.88	2.57	2.86	2.76

RATE THE PRESENTATION EVALUATION (CONTINUED) (1985)

		Challenging	Interesting	Informative	Total
23.	"Paul Jacobs and the Nuclear Gang"	2.36	1.76	1.97	2.01
24.	Discussion of above film	2.54	2.07	2.17	2.25
25.	Philosophical foundation of controversial issues, planning group strategies (MT)	2.18	1.90	1.83	1.97
26.	Discussing implementation problems	2.38	2.37	2.27	2.34
27.	Decommissioning (BM)	2.35	1.77	1.67	1.91
28.	Decommissioning (Richardson)	2.35	1.80	1.80	1.94
29.	Energy alternatives (Anderson)	1.89	1.50	1.45	1.60

Other:

30. _____

31. _____

32. _____

Please comment on the following:

1. Was there an appropriate balance of technical information and curriculum activities?

2. Any topics that we left out that should be covered?

3. Would you recommend that we delete anything we did cover?

4. Was the work load too heavy, adequate, too light?

5. In the space below or on the back please write any other general comments that would be useful for us in planning our next workshop.

RATE THE EXERCISE EVALUATION SHEET (1985)

	Challenging	Interesting	Replicable	Total
1. Nuclear fuel cycle drawings	2.07	2.03	1.67	1.92
2. Nuclear reactor coloring	2.57	2.47	1.57	2.20
3. Lowell experiments	1.78	2.63	3.44	2.59
4. Bias and propaganda: Analyzing adverts	2.03	1.63	1.60	1.76
5. Bias and propaganda: ABC news analysis	2.48	1.93	2.00	2.14
6. Bias and propaganda: Group exchange	2.07	1.90	1.77	1.91
7. Kurt's Dilemma	1.78	1.38	1.29	1.48
8. Collective Question Formulation	2.57	2.63	1.93	2.38
9. TMI computer simulation	1.34	1.61	2.22	1.71
10. Indian Point hearing	1.48	1.37	1.69	1.51
11. Quantitative exercises for classroom use	2.57	2.70	2.57	2.61
12. Edgemont simulation	1.70	1.63	1.93	1.75
13. Nuclear power/weapons brochure	2.14	2.03	1.87	2.01
14. Implementation planning sessions	2.75	2.23	N/A	2.48
15. Values line: Would you build a house .....?				

APPENDIX 8

ADVERTISEMENTS METHODOLOGY

Age _____

Occupation _____

Highest Degree Held _____

Major Field _____

ADVERTISEMENTS METHODOLOGY

PART ONE: PERSONAL RESPONSE TO THE AD

1. One of the main purposes of an advertisement is to grab your attention. You are compelled to look at an ad because it presents interesting, pleasing, or unusual images. Take fifteen seconds and look at the advertisement you have been given. Then close your eyes. In the space below write down the images or words that most clearly stand out.

2. The advertisement consists of images, symbols, and text.

IMAGES are the pictures that are presented to you. There are probably particular images which stand out.

TEXT represents the words that are used to describe the meaning of the advertisement. There are probably particular words that stand out for you.

SYMBOLS are the pictures (images) and words (text) that have deeper meaning for you. They cause you to develop additional images as a response to the original image or text.

Look at the advertisement again. Study it for one minute. Based on your personal response to this advertisement, write down the key symbols in the space below. Briefly describe how each symbol makes you feel.

SYMBOL	MEANING

3. Spend five minutes reading and studying the advertisement in great detail. Describe what you think the key symbols in this advertisement are supposed to mean.

SYMBOL MEANING

4. Now that you have studied the symbols and you have read the entire advertisement, try to analyze the message. List and rank (first, second, third) the most important messages that this advertisement is trying to convey.

One (1)

Two (2)

Three (3)

PART TWO: THE CONTROVERSIAL MESSAGE

The purpose of this part of the exercise is to understand how controversial issues are portrayed in advertisements. Messages are controversial because they directly address a controversy or because they state such a strong point of view that they seem to assume that there is no controversy.

1. On a one to five scale (One highest, Five lowest) indicate in the spaces below how this advertisement addresses what you previously listed as its most important message.

Alerts my attention to the importance of the issue _____

Alerts my attention to the complexity of the issue _____

Alerts my attention to the controversy of the issue _____

It states how the company feels about the issue _____

It states what the company is doing about the issue _____

It states what the company feels society should do about the issue _____

2. Place a check on the line following the statement you most agree with:

A. The advertisement ignores an important controversy _____

B. The advertisement brings attention to a controversy by suggesting a compromise position _____

C. The advertisement represents the controversy as an either/or proposition _____

Go to section A, B, or C depending on which line you checked. When you finish the relevant section, be sure to answer questions 15, 16, and 17 on the last page.

SECTION A

The advertisement ignores an important controversy.

3. What controversial issue/s do you think the advertisement is ignoring?

4. Why does the advertisement ignore the controversy?

5. What are the assumptions behind the perspective (message) that is conveyed in the advertisement?

6. What would an alternative perspective be?

SECTION B

The advertisement brings attention to a controversy by suggesting a compromise position.

6. What is the compromise position suggested by the advertisement?

7. In your opinion, is this compromise a legitimate solution? If it's not a good solution, why isn't it?

8. Is the compromise really a compromise or does it just give lip service to the alternative point of view?

9. What assumptions represent the foundation of the compromise position?

10. Can you describe an alternative compromise solution that would be better than the one that is offered?

SECTION C

The advertisement represents the controversy as an either/or proposition.

11. How does the advertisement describe the either/or position?

12. Are the two perspectives fairly represented? Why or why not?

13. What are the fundamental assumptions that form the basis of the different perspectives?

14. Which perspective do you agree with? Does the advertisement persuade you to agree with a particular perspective?

PART THREE: LISTING THE CONTROVERSIAL ISSUES

15. Please consider the advertisement one last time. Then list and rank the three most important controversial issues that are inherent in the ad.

Issue One

Issue Two

Issue Three

16. For each issue listed above, please describe as briefly and clearly as possible the contrasting positions that define the controversy.

Issue One

Issue Two

Issue Three

17. For each issue listed above, state which point of view, if any, you agree with.

Issue One

Issue Two

Issue Three