DOCUMENT RESUME

ED 278 610 SO 017 951

AUTHOR White, Charles S.
TITLE The Role of the Secondary Social Studies Curriculum in Developing Technological Literacy.
PUB DATE Feb 87
NOTE 14p.; Paper presented at the National Science, Technology, Society Conference (2nd, Washington, DC, Feburary 6-8, 1987).
PUB TYPE Viewpoints (120) -- Speeches/Conference Papers (150)

EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS *Citizenship Education; *Curriculum Development; Decision Making; Economics Education; Global Approach; History Instruction; Law Related Education; Participation; Secondary Education; Secondary School Curriculum; Social Problems; *Social Studies; Sociology; *Technological Literacy

ABSTRACT

"Literacy" is a hot buzzword for schools today. This is evident from the number of "literacies" that are making claims on the traditional subject-matter territory of the pre-college curriculum. Typically, each subject area of the school is asked to play a role in the achievement of these "literacies." Such is the case with "technological literacy" and the social studies curriculum. Focusing on the secondary curriculum only, this paper examines whether social studies should play a role in the development of technological literacy, and whether social studies is equipped to play a role in the development of technological literacy, specifically at the secondary level. The former task requires the formulation of a defensible rationale for social studies becoming involved in such a literacy effort, given the fundamental purposes of social studies education. The latter requires the design of a curricular framework within which the social studies' role may be most effectively performed, consistent with the content and methods of social studies education at the secondary level. After describing this framework, the paper concludes that the development of technological literacy is consistent with the purposes of social studies education and that the framework proposed should sharpen students' awareness not only of current social impacts of science and technology but also of issues arising from now unforseen scientific achievements and new technologies. (AA)

THE ROLE OF THE SECONDARY SOCIAL STUDIES CURRICULUM IN DEVELOPING TECHNOLOGICAL LITERACY

Charles S. White
Director
Center for Interactive Educational Technology
George Mason University
Fairfax, Virginia

Paper delivered at the Second National Science, Technology, Society (STS) Conference, Washington, D.C., February 6, 1987.

Introduction

"Literacy" is a hot buzzword for schools today. This is evident from the number of "literacies" that are advancing claims on the traditional subject-matter territory of the pre-college curriculum. Typically, each subject area of the school is asked to play a role in the achievement of these "literacies." Such is the case with "technological literacy" and the social studies curriculum. Focusing on the secondary curriculum only, this paper examines whether social studies should play a role in the development of technological literacy, and whether social studies is equipped to play a role in the development of technological literacy, specifically at the secondary level. The former task requires the formulation of a defensible rationale for social studies becoming involved in such a literacy effort, given the fundamental purposes of social studies education. The latter requires the design of a curricular framework within which the social studies' role may be most effectively performed, consistent with the content and methods of social studies education at the secondary level.

Rationale

The Nature of Technological Literacy

A person who is technologically literate is one who is comfortable living in a technologically-rich environment. This suggests a certain level of knowledge about technology and its impact on his or her life, as well as a level of skill in discussing and deliberating issues that are science- and technology-based. Technological literacy also suggests a level of comfort

in employing a wide range of technologies in daily life, though this third point is not the focus of this paper.

Where Technological Literacy and Social Studies Meet

The relevance to social studies of achieving technological literacy was presented most cogently in an ERIC paper by John J. Patrick and Richard C. Remy titled Connecting Science, Technology, and Society in the Education of Citizens (1985). Educating for good citizenship has been a central purpose of education from Plato's Republic to the present. One notion inherent in some conceptions of self-government is that of active, informed and effective participation of citizens in the governing process. This idea is represented most clearly by the participatory democracy theories of John Stuart Mill, Rousseau, and Jefferson. Participation of the nature advocated by these theorists requires that citizens be (1) sufficiently informed on matters and issues that have arrived in the political arena, in order (2) to make rational decisions about those matters and issues with enough confidence that (3) they are likely to act on those decisions (to participate) in a manner most likely to affect policy (effective participation). While certainly applicable throughout the school curriculum, the effort to prepare citizens in these three respects has traditionally fallen most heavily on social studies education.

Remy and Patrick pointed out, however, that the social effects of science and technology have greatly complicated the development of good citizens, as described above. Social issues relating to advances in science and technology are growing in complexity, and the task of becoming informed on these issues requires a broad interconnection of knowledge fields in the school curriculum. Finally, Remy and Patrick noted the negative effects of science and technology antagonists. Represented in part by advocates of such

pseudo-scientific positions as "scientific creationism," these antagonists misunderstand (or misrepresent) the nature of science and scientific inquiry, and generate suspicions that militate against a clear understanding of science- and technology-related issues on the part of citizen decisionmakers.

In sum, if citizens cannot comprehend social issues because of the complexity wrought by science and technology, they cannot make rational decisions about these issues. Without confidence in their own decisions, and without understanding and tolerating the tentative nature of decisions made under circumstances of uncertainty, citizens will choose not to participate, or their participation will be ineffective in influencing the course of social and political policy. A reasonable conclusion to draw is that social studies education ought to be intimately involved in the development of technological literacy, since such knowledge and comfort are fundamental to good (effective) citizenship and, thus, fundamental to the purposes of social studies education.

Curricular Framework

Having argued that social studies should play a role in technological literacy, it is necessary to examine what the nature of that role should be, particularly within the secondary social studies curriculum. Again, Patrick and Remy (1985) provided a useful curriculum framework for contributing to technological literacy, and have done so recognizing the central content and methods of social studies education.

Three Elements of the Framework

Patrick and Remy presented a persuasive argument against a proliferation of interdisciplinary courses and in favor of incorporating threads within existing, distinct subjects that are likely to integrate the sciences and the social studies. In the former case, both teachers and students tend to find the demands of these courses overwhelming. Students find themselves studying concepts and issues that have been removed from their original context, and thus are deprived of sufficient understanding of the foundational disciplines on which the course is based. Teachers are hard-pressed to acquire sufficiently broad knowledge to tie disparate disciplines together coherently. Moreover, an historical perspective is frequently under-represented in such courses. The authors recommended, instead, linking science and social studies courses by two kinds of integrative threads: "cognitive skills in decision making and content themes pertaining to social issues in science and technology" (p 45).

Given the earlier rationale-building discussion, I believe a third integrative thread is essential to an adequate curricular framework: participation skill development. Too frequently, decision making ends with a statement of action one would or might carry out or lobby for if one were to participate in the political process. However, political participation is not an innate tendency of citizens, and involves knowledge and skills quite different from those likely to be addressed within other components of science or social studies courses. Moreover, participation is not an end in itself, but carries with it strong educative effects, magnifying the impact of the two threads proposed by Patrick and Remy. The educative benefits of participation figure prominently within participatory theories of democracy (Pateman, 1970). In addition, the combination of social issues, decision

making, and participation are well-represented within social studies education, particularly in what Barr, Barth, and Shermis (1977) referred to as the reflective inquiry tradition. (For a discussion of theoretical and philosophical links between participatory democratic theory and reflective inquiry, see White, 1985.)

Secondary Social Studies and the Curricular Framework

For number of reasons, the secondary social studies curriculum provides a fertile field for cultivating technological literacy. Students at the secondary level are more able to manipulate fairly large amounts of data, and to analyze that data based on concepts that have matured over their school years. Expressing a high need for relevance, secondary students can be more readily drawn into an examination of science and technology issues than their younger counterparts. Making decisions on social issues that "count," and engaging in participation activities that attempt to influence public policies they view as important are experiences in which secondary social studies (and science) students can channel considerable energy.

Social Issues

A focus on social issues in social studies is extremely appealing among a significant subset of social studies professionals. In the November/ December 1986 issue of Social Education, Engle and Ochoa proposed building a social studies curriculum around significant social issues and problems, with a heavy emphasis on decision making. Indeed, one would be hardpressed to find another conceptualization of social studies that is more congenial to fostering technological literacy than this one. Nonetheless, even if one assumes little change in the current scope and sequence of social studies at

the secondary level, a significant range of science and technology issues can be addressed.

World History and American History courses. Paramount among relevant issues are the ways in which science and technology affect society, both in the past and the present. For the former, World History is a natural locus of explorations on this issue. Examining the impact of the power loom on the emergence of the Luddite Movement is a case in point. Of course, World History courses also provide opportunities to examine the history of science and scientific inquiry, a point stressed by Patrick and Remy (1985). U.S. History is similarly ripe with science- and technology-related social issues. One area I find particularly interesting at the moment is the effect of science and technology on interpretations of the Constitution, an appropriate area of examination during upcoming bicentennials.

American Government and Civics. A study of the Constitution, of course, is also central to American Government and Civics courses. These courses offer numerous opportunities to explore science and technology issues. Consider the topic of political participation of citizens. Computer-based technology has made interactive television a reality, with the QUBE system of Columbus, Ohio, a useful example. It is technically possible for people to "vote" on referenda from the comfort of their easy chairs by pushing a button and sending a signal to a central facility. Imagine the potential for citizen participation: the pure democracy ideal of ancient Greece, where representatives are no longer needed to express the popular will and individual citizens vote on national legislation. The issue: given the chance to vote on hundreds of issues, great and small, how many of us would take the time to research each issue rather than cast our votes hastily and thoughtlessly? If it was easy to cast a ballot for

President at home, rather than having to go to the polling place and fill out a ballot, would the result be more uninformed citizens voting? On the other hand, given our faith in the educative powers of participation, perhaps such direct participation would enhance the knowledge and wisdom of the citizenry.

Consider another issue relating to American government and civics courses: the extent to which the goverment places undue faith in technological solutions to difficult domestic and foreign policy problems. The Strategic Defense Initiative might be an exemplary case in point. In the context of public schools, some would suggest that computer literacy efforts represent a desire to find a technological panacea for that institution's current woes.

Sociology. The application of science and technology has raised a number of ethical, legal, and moral issues in areas one might associate with the subject matter of sociology. For example, when does the noble prolongation of life change to the demeaning prolongation of death? Who shall decide which patient receives the exotic and enormously expensive medical procedure while the other patient dies? How does the quality of social interaction change when telecommunication permits invisible dialogs and telecommuting? Are we at risk of becoming so dependent on technology that we are helpless in its absence (when the calculator's battery dies)?

Economics. In economics courses, the use of technology to improve productivity carries with it a host of social issues. Shall we permit the widespread increase of "steel-collar workers" (robots) to displace human employees? What limits shall we place on programmed trading in the financial markets? How shall we balance the "externalities" of

technological progress (e.g., pollution, unemployment) with American's quality of life?

Global studies. A fascinating area of study called geophysiology views the globe, and its thin atmospheric envelope, as a total living system, of which humanity is only one small, though influential part. Given the power to permanently alter the "geophysiology" of the global environment, what limits shall we place/can we place on the application of science and technology to avoid dooming ourselves to extinction? To what extent can we depend on future scientific and technological advances to balance the ill-effects of current applications of science and technology?

Law-related education. New technological developments generate new legal questions, challenging existing conceptions of justice and fairness. How far shall the protection of intellectual property extend? Shall it extend to the "look and feel" of computer software? Shall it extend to new genetically-engineered life forms? (Shall these be copyrighted or patented?) What is the legal status of a frozen in vitro embryo when both biological parents are deceased?

The social issues enumerated above only begin to represent the scope of technology- and science-related issues relevant to existing courses within the secondary social studies curriculum. Each issue ultimately resolves to a call for a decision, demanding the application of effective decision-making skills.

Decision Making

Decision making is a skill and, as such, can be taught and can be practiced by application to social issues. As a skill, the process of decision making can be reduced to a series of steps that, if followed, are likely to result in a rationale decision. One useful tool in teaching the

process of decision making is the decision tree, provided by Remy and La Raus (1978) and derived from the decision sciences. The tree illuminates four basic elements in decision making: (1) discovery of the need for a decision, (2) identification of the important goals and values relevant to the decision, (3) identification of alternative courses of action, and (4) prediction of the consequences (positive and negative) of alternative courses of action in light of the goals and values identified.

As clean as this conception of decision-making process may appear, we must consider (as Patrick and Remy do) the realities of citizen decision making. The decisions citizens make are fraught with risk, in that the consequences of alternative courses of action are not predictable with certainty. Moreover, circumstances may change such that, given the same occasion for decision, a different alternative might be chosen. This latter point underscores the tentative nature of citizen decision making, and the need to emphasize a willingness to reassess past decisions in light of new information.

Within the context of social issues, decision making of the nature described here represents a useful link between science and secondary social studies:

> Science, or more precisely the methods and results of the many sciences, contributes vital knowledge about the possible consequences of science- and technology-related decisions. The social studies contributes ethical and value perspectives to the decision-making process. They shed light on the moral, social, and human values outside the realm of science that are involved in such choices. They help decision makers--whether they be individuals or groups--rank and select among preferred outcomes and make value judgments. They can also contribute knowledge about the history of an issue and the public policy processes associated with it. (Patrick & Remy, 1985, p. 53).

Participation

The third and final element of the curriculum framework is political participation, another skill area largely ignored in the secondary social studies curriculum but crucial to a complete preparation for effective democratic citizenship.

Much of what passes as instruction for participation reduces to prescriptions of a narrow range of activities (like voting), and typically vague recipes for actions of questionable effectiveness in influencing distant policy makers. Such practices do not instill a high sense of political efficacy among the secondary student population. It is not surprising to find, then, that few students in a national survey believed they could help solve social problems related to science and technology (Hueftle, Rakow, and Welch, 1983).

Two approaches to participation skill development may help reverse this sense of helplessness for secondary social studies students. First, instruction in political participation should advance on two levels, described by Newmann (1980) as communal (local) participation and societal (national) participation. This duality recognizes the very different participation environments at the local, proximal level as opposed to the national, distant level. Participation activities and strategies that are appropriate and effective at one level are distinguished from those that are more appropriate and effective if employed at the other level. For example, active participation in a political party might be the most effective means to influence societal-level (national) policy, while neighborhood canvassing might be more likely to influence communal-level (local) policy.

Second, recognizing the dual nature of participation, the secondary social studies curriculum should provide opportunities for students to become involved in both communal and societal participation activities. One provocative example is offered by Engle and Ochoa (1986), who recommend that students be able to pursue "citizen internships." These internships would allow regular participation in some civic activity, most likely of the communal type. Internships, and other vehicles for genuine political participation, recognize the educative benefits of participation. Moreover, they allow students to achieve a sense of completion and closure, by initiating actions derived from their analysis of science- and technology-related social issues and their decision-making deliberations.

Summary

The case has been made for the secondary social studies curriculum to play a significant role in the development of technological literacy. Doing so is consistent with the purposes of social studies education, and can be accomplished without doing violence to the fundamental content and methods of the field. An effective role in STS is most likely to be achieved through a curricular framework that integrates science, technology and social issues within the context of existing secondary social studies courses. That framework uses science- and technology-related social issues as content, and decision making and participation skills as methods of understanding and acting on these social issues.

An effective social studies role in technological literacy should foster an ongoing alertness to social impacts of science and technology. This means focusing, for example, not on the automobile (the technology) but on the emergence of suburbs (the social impact); not on the atomic bomb, but

on the arms race; not on atomic power, but on nuclear waste dumps; not on medical life-support systems, but on living wills. Finally, while the approach to technological literacy discussed in this paper should yield positive results in addressing these and other current social issues, the proposed curricular framework should also sharpen students' awareness of issues yet to be identified--issues precipitated by now-unforeseen scientific achievements and new technologies.

References

Barr, R.D., Barth, J.L., & Shermis, S.S. (1977). Defining the social studies. Arlington, VA: National Council for the Social Studies.

Engle, S.H., & Ochoa, A. (1986). A curriculum for democratic citizenship. Social Education, 50, 514-525.

Hueftle, S.J., Rakow, S.J., & Welch, W.W. (1983). Images of science: A summary of results from the 1981-1982 National Assessment in Science. Minneapolis: Science Assessment and Research Project--Minnesota Research and Evaluation Center.

Newmann, F.M. (1980). Political participation: An analytic review and proposal. In J. Gillespie and D. Heater (Eds.). Political education in flux. London: Sage.

Pateman, C. (1970). Participation and democratic theory. Cambridge: Cambridge University Press.

Patrick, J.J., & Remy, R.C. (1985). Connecting science, technology, and society in the education of citizens. (ERIC Clearinghouse for Social Studies/Social Science Education, Inc., Boulder, CO).

Remy, R.C. & La Raus, R. (1978). Citizenship decision-making: Skill activities and materials. Reading: Addison-Wesley.

White, C.S. (1985). Citizen decision making, reflective thinking and simulation gaming: A marriage of purpose, method and strategy. Journal of Social Studies Research Monograph 2.