

SCIENCE FOR THE PEOPLE

Special Issue on Science and Education

Education and Capitalism

The Competency Controversy

Scientific Management and Education

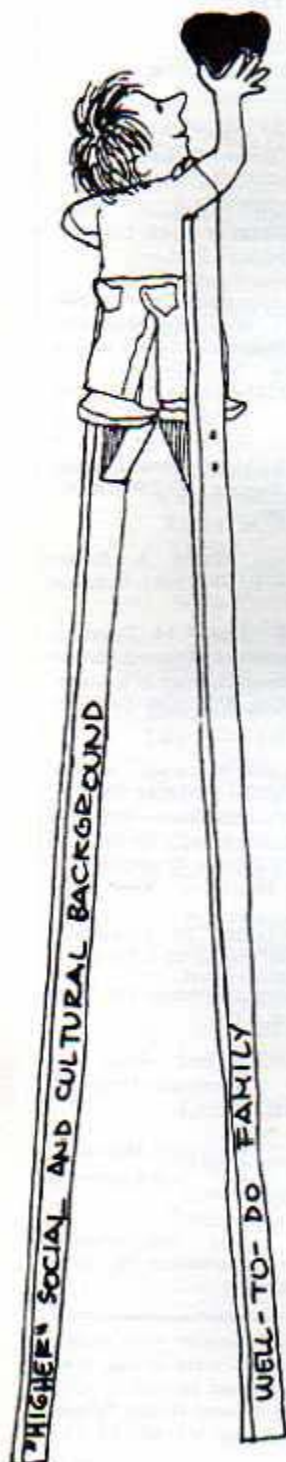
Jonathan Kozol's Tactics for Teachers

A Course on Women in Science

Tale of a Substitute Teacher

Resources for Teachers

Course Descriptions



CHAPTERS AND CONTACTS

Science for the People is an organization of people involved or interested in science and technology-related issues, whose activities are directed at: 1) exposing the class control of science and technology, 2) organizing campaigns which criticize, challenge and propose alternatives to the present uses of science and technology, and 3) developing a political strategy by which people in the technical strata can ally with other progressive forces in society. SftP opposes the ideologies of sexism, racism, elitism and their practice, and holds an anti-imperialist world-view. Membership in SftP is defined as subscribing to the magazine and/or actively participating in local SftP activities.

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Science for the People magazine is published bimonthly by the national organization Science for the People (see facing page for chapters and contacts). Our address is 897 Main Street, Cambridge, MA 02139. Tel: (617) 547-0370. We welcome contributions of all kinds: articles, book reviews, artwork, cartoons, etc. Please see our editorial guidelines on the inside back cover. *SftP* is intended for all people interested in a progressive and radical view of science and technology. Our subscription rates are \$7 per year (regular subscribers), \$10 per year (foreign subscribers) and \$16 a year or whatever you can afford (member subscribers). Member subscribers receive the magazine plus our internal newsletter and other internal communication. For legal purposes, *Science for the People* is incorporated. *SftP* is available in microfilm from Xerox University Microfilms, 300 North Zeeb Rd., Ann Arbor MI 48106.

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about this issue

The Boston Science and Education Editorial Group selected the articles for this issue of SftP magazine based on our interests and experiences as teachers. We are concerned with the need for change in education, particularly science education, and are well aware of the difficulties confronting teachers who attempt these changes. For the most part we have been teaching high school in systems which deny the possibility and/or need for reform. At the same time we have been working within SftP to develop our sense of the important role politics plays in schools. We recognize the difficulty of simultaneously meeting the demands of required curriculum and attempting to integrate our growing political awareness into our teaching methods. We believe, nonetheless, that teachers can make small inroads of educational reform in their classes, that these inroads are important, and that, in the long run, greater numbers of people working together are needed for lasting change.

In this About This Issue, we take on a rather large task. In addition to summarizing the articles we have chosen, we discuss the problems in our educational system, some solutions, and some of the frustration and obstacles involved in the process.

An Historical Perspective

We believe that the source of the problems in American education is that schools are designed to meet the needs of our economic system. Marvin Kalkstein, in his review of Bowles and Gintis' *Schooling in Capitalist America*, describes how schools were founded to assimilate a new group of immigrants into the growing industrial economy. Schools continue today to fulfill this function of forming able-bodied workers. The teacher, in Bowles and Gintis's view, is a facsimile of the foreman, supervisor, or boss. Bowles and Gintis shed light on the rationale for the controls and rules we see in most schools: the lines, the handraising, the unquestioning of authority. Kalkstein's review of their book provides a context within which to view and understand some of the underlying problems in American education.

Kalkstein touches on some of the ways in which schools continue today to be geared toward regimentation and control. David Boucher in his article on the use of management techniques in teaching reading, and Paula George, in her article on the increased use of minimum competency testing for high school gradua-

tion, amplify Kalkstein's review with two specific examples. They both illustrate how schools are moving in directions that further develop their factory-like qualities and show how educators now use "scientific" techniques to legitimize and validate these qualities.

The Business of Schools

Boucher describes the use of a "Taylorized" approach to teaching reading, so called after the man who devised this efficiency method of running factories. According to Boucher, major publishing houses have developed a comprehensive elementary reading course which works uniformly, regardless of the teacher, student, or classroom atmosphere. It reduces the teacher's role to that of a monitor, demands that children learn in a singular, regimented fashion, and shifts the responsibility of educating away from the schools. If this curriculum gains popularity, more children could more easily be designated "slow learners" or "ineducable". Boucher's article touches on many facets of the issue surrounding scientific approaches to teaching reading but, due to time and space limitations, these intriguing dimensions could not be fully developed.

The issue of competency testing, which raises some of the same concerns as that of scientific teaching techniques, demands immediate attention due to its growing presence throughout the nation. Competency testing is a complex issue. It could have value in bringing up the standard of education throughout the country. The manner in which it is presently used, however, serves to split student bodies, largely along socio-economic class lines, make profits for publishing houses, and place the burden of becoming educated onto the student. It is not used as it might be to facilitate institution of remedial classes or to determine weak spots in a school's performance. George elicits the many implications of the minimum testing controversy.

Attitudes Toward Science

The use of science to justify the educational "innovations" of competency testing and management methods of teaching reading reveals the elevated position of science in our society. Too few people feel equipped to evaluate the social implications of scientific endeavors, some of which do not contribute to the majority's well-being. We must strengthen our skills and confidence so

that more people can participate in everyday science and in policy decisions affecting the course and outcome of scientific work.

We believe that many of the attitudes which place science on its isolated pedestal and which contribute to people's sense of incompetency in matters of scientific policy-making are formed in our schools. The teacher, for the most part, stands at the head of the class, asks questions to which there is supposedly one answer, rewards those who answer correctly, and punishes those who don't. This process contributes to the impotence students often feel. Science education is particularly guilty of employing this approach. It does so by teaching objective facts without dealing with their implications on people's lives. Science becomes abstract and distant for many.

Teaching Suggestions

For the teacher with some flexibility in course content and political accountability, we include in this issue course outlines, a lesson plan, an alternative model of teaching, and tips for teachers.

In Margaret Alic's course description on women in science, we see how, even more than the general population, women have been excluded from science. So great has been the sense of the inappropriateness of science as a field for women, that many women's contributions have been ignored. If we are ever to attain more power to monitor the uses of science, women must be included among those who feel competent to consider the issues. Margaret Alic's course description begins to work in this direction.

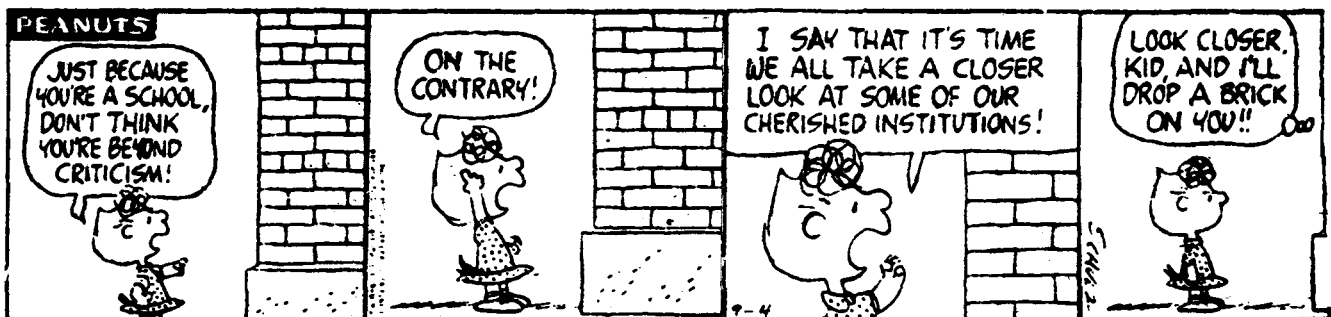
George Salzman and the Food and Nutrition Group of the Boston chapter, concerned with the neglect of the social and political implications of science, have created and utilized alternative curricula. Salzman's course "Science for Humane Survival" is geared to college students, while the Food and Nutrition Group's "Feed, Need, Greed" lesson plan is directed toward high school students. These curricula speak to the complex issues of food production, hunger, population, and ecological living, and bring these world problems to the personal level in the hopes of affecting change within a political framework.

Brenda Lansdowne describes an educational model which deals with the method of teaching rather than the content. In what she calls "investigative colloquia", the teacher assumes the role of facilitator while the students on their own share and discover scientific, philosophical, and historical concepts. In this manner, children gain a sense of their own importance in their education and the power of their ideas.

Fighting Back is a recent, unpublished manuscript by Jonathan Kozol, in which he proposes ways of integrating social change into the classroom and community. We have excerpted his "Tips for Teachers," some of which can easily be used in the classroom. He gives ideas on how teachers can in their attitude and approach expose the political overtones of a subject matter. In addition, Kozol introduces more radical tactics to begin social transformation at the community level.

Although we firmly believe in the aims of these alternatives, few teachers have the time to meet the demands of required curricula and develop additional course material. A teacher faces many risks, in most cases, if she or he decides to integrate politics into the classroom: alienation of colleagues and students, and the threat of losing his or her job are only a few. Nancy Brown's vignette of her experiences as a substitute in the Boston schools further impresses us with the near impossibility of the teacher's task. Brown reminds us of the student's desperation and justified apathy.

In summary, we see and support the need for small steps toward changing schools. Ultimately, we believe that only broader sociopolitical change can alleviate the deep-seated problems in our educational system. We feel that schools presently mold students to a troubled world. What we desire is schools that educate people for a different reality based on more humane values and a more equitable economic system. Change, nonetheless, is a slow evolving process, and we, as teachers, struggle daily to act upon some of the ideas, suggestions and tactics described in these pages. It is our hope that these ideas will be valuable not only to teachers, but to everyone concerned with transforming present attitudes toward science and empowering the students who now emerge from our public school systems. □



Looking Left/cpf

letters



Dear SftP,

Carol Cina's and Ted Goldfarb's note of explanation published in the September/October issue of *SftP*, and intended to accompany their article about Three Mile Island in the previous issue, illustrates a dangerous trend in the Left today. The elevation of the anti-nuke struggle to a position of importance greater than that of the class struggle only serves to divert attention from the economic causes of *all* capitalist misadventures. This trend is analogous to a problem which Lenin termed Economism, that is, concentrating on narrow "bread and butter" issues. The danger of starvation faced by the Russian people was of no less consequence than the danger of radioactive cremation we face today. But the Bolsheviks knew that only by changing the fundamental structure of society can capitalism be prevented from sowing its destruction in another form or place. Similarly, we must remember that any gains we make in the anti-nuke struggle will be paid for through black lung disease, air pollution, and unemployment — unless we go on to smash the system which produced nukes in the first place.

Our role, as politically conscious members of the anti-nuke movement, should not be to minimize the importance of the class basis of the struggle. Rather we should try to unite this struggle with other people's movements in this country and abroad to form a cohesive Anti-Capitalist Movement, conscious of its historical mission. This strategy will not be advanced by poo-pooing socialist nations for their nuclear programs, regardless of how idiotic those programs may be. (I do *not* mean to imply that we should not learn from mistakes made in socialist countries, nor that we should not support efforts by the majority of people in those countries to bring their societies under more democratic control.)

Carol's and Ted's "conscious decision to refrain from using terms like capitalism, ruling class, or imperialism" — terms which merely imply the political analysis we *should* bring to the movement — results from this problem of

misplaced emphasis. Some members of the Union for Radical Political Economics (URPE) described the alternative to this position more eloquently than I can. They said:

[We] can begin to make "socialism" and "communism" household words, rather than dirty words, by calmly and sensibly explaining what we mean by those words in our own domestic context. Fear cripples our struggles. If we seem afraid of the labels, they [corporations and the government] will pin them on us. If we insist, instead, that political discussion focus on the necessity of an anti-capitalist movement, and we incorporate those labels into our discussion, we can wear them proudly. We will have taken one giant step toward resisting future repression.

[Economics Education Project of URPE, *U.S. Capitalism in Crisis*; URPE, New York; 1978; p. 335.]

To refrain from using terms that only suggest these labels is even more crippling.

"Dirty words" were used during my own induction into radical politics. At a sociobiology forum sponsored by the Stony Brook chapter of SftP two years ago, Carol gave an address which some members of the audience denounced as "dogmatic." I became interested in SftP, however, because she incorporated the "dirty words" into a sensible analysis of a problem with which I was personally concerned. Subsequently, evolutionists who attended the forum, while vociferously deploring Carol's rhetoric, incorporated the SftP analysis into their own critiques of sociobiology. The terminology of scientific socialism, used correctly, can have an even greater progressive impact on the anti-nuke movement, a mass movement which is already beginning to challenge the capitalists' right to control our lives.

With love and solidarity,

Steve Push
Washington D.C.

Dear SftP:

I just finished browsing the May/June issue of *Science for the People*. I am sorry my wife spent the buck twenty five for it. Would rather have a beer even if it contains some remote carcinogens.

It seems that soft handed intellectuals have nothing better to do than look for some new group of oppressees. It beats working or giving your movie money to feed someone. It might be exciting to you guys but it is boring to us.

It does seem a shame that capitalist systems have structural oppression built into them. Yet most of the oppressed people in this country live far better than their peers in "workers paradises". Although socialism does not structurally demand oppression, the physical, political and intellectual oppression in China, Cuba, Russia, not to mention the prisons of Vietnam and Cambodia, outdo the limp-wristed local varieties by a country mile. I think socialists overlook or minimize some of the basic human traits. They will never get their act together until they recognize these very natural drives and design their systems around them.

Regards,
Jim Conley

The Editorial Committee replies:

Dear Jim:

Either your wife is an impulse shopper, or your marriage is on the rocks. We debated whether or not to answer your letter, but your ability to mouth so many capitalist cliches in such a short space was just too good to pass up. Where can we begin? Giving your "movie money to feed someone" might make you feel noble, but it won't do much to alter the social relationships that ensure that some people will grow rich off of the misery of others. Of course if you really want to avoid getting involved, you can just invoke "basic human traits" as a justification for capitalism. After all, it will put you right in line with great thinkers through the ages who have invoked the basic inferiority of Irish, Italians, Jews, Blacks and Women as a justification for whatever oppressive notion they were trying to enforce. If we can't invoke an innate genetic tendency as an explanation for exploitation, well then I'm sure some enterprising oil company will manage to discover a new set of stone tablets in the mountains of the Sinai with that as the eleventh commandment.

(continued on page 11)

Education and Capitalism

A Review of Bowles and Gintis' Schooling in Capitalist America

by Marvin Kalkstein

A primary objective of those in control within a society is to stay in control. Most institutions and organized activities within society function to serve the purposes of the ruling class. One of the primary institutions for maintaining, consolidating, and increasing control over people is the educational system. An excellent book that studies how education has been organized and used within the American capitalist economy is *Schooling in Capitalist America: Educational Reform and the Contradiction of Economic Life* by Samuel Bowles and Herbert Gintis (New York: Basic Books 1976. 340 pp. \$4.95). The book traces and explains the evolution of mass education in the United States to meet the changing labor demands of the developing capitalist industrial economy.

Education and Socialization

Capitalist production is not simply a technical process, but also is a social process (Bowles and Gintis, p. 10). In serving the needs of capitalist production, education must not only prepare workers to carry out technical tasks, but also to fit into an appropriate set of social relations. Probably the most important purpose and effect of education is socialization. Education prepares people for their place in society. Contrary to popular belief, education is generally not the means to change one's place in society. Bowles and Gintis conclude that U.S. education is highly unequal; the chances of obtaining much or little schooling being substantially dependent on one's race and parents' economic level (p. 35). They present data showing that:

intellectual ability developed or certified in school makes little *causal* contribution to getting ahead economically.(p.110).

The genetic arguments of Jensen and Herrnstein regarding IQ and its relationship to class are thoroughly exploded in Chapter 4 — "Education, Inequality, and the Meritocracy."

Major characteristics of the American workforce, necessary for the social relations of capitalist production, are that it is hierarchical, fragmented, and alienated. The educational process, and the relations experienced within it, "foster types of personal development compatible with the relationships of dominance and subordinancy in the economic sphere" (p. 11).

The personal traits and attributes that are particularly encouraged include unquestioning acceptance of authority, conformity, acceptance of routine, lack of imagination, discipline, and good work habits (e.g. diligence, perseverance, punctuality). Other characteristics indicated by Bowles and Gintis as rewarded in a New York high school were dependability, consistency, identification with school, empathizing orders, deferred gratification, externally motivated predictability, tactfulness; penalized were creativity, aggressiveness, independence (p. 137). Most of these rewarded traits are ones which will assure a placid work force that can be readily controlled by management.

Form and Content of Education

Since the major concern of schools is for personality and behavioral traits, it is in the form and process, rather than the content, of the educational encounter that our development is conditioned. It begins with the

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first day we're sent off to school with out parents' admonition "to be good little girls/boys and listen carefully to the teacher and don't ask any questions" and continues in different degrees for as long as we remain in the educational system. Bowles and Gintis point out that:

the educational system operates in this manner not so much through the conscious intentions of teachers and administrators in their day-to-day activities, but through a close correspondence between the social relationships which govern personal interaction in the work place and the social relationships of the educational system. Specifically, the relationships of authority and control between administrators and teachers, teachers and students, students and students, and students and their work replicate the hierarchical division of labor which dominates the work place. Power is organized along vertical lines of authority from administration to faculty to student body; students have a degree of control over their curriculum comparable to that of the worker over the content of his job. The motivational system of the school, involving as it does grades and other external rewards and the threat of failure rather than the in-

trinsic social benefits of the process of education (learning) or its tangible outcome (knowledge), mirrors closely the role of wages and the specter of unemployment in the motivation of workers. The fragmented nature of jobs is reflected in the institutionalized and rarely constructive competition among students and in the specialization and compartmentalization of academic knowledge. Finally, the relationships of dominance and subordination in education differ by level. The rule orientation of the high school reflects the close supervision of low-level workers; the internalization of norms and freedom from continual supervision in elite colleges reflect the social relationships of upper-level white-collar work. Most state universities and community colleges, which fall in between, conform to the behavioral requisites of low-level technical, service, and supervisory personnel (pp. 11-12).

The students' alienation from schools which are dull, routine, and repetitive conditions them for alienated work which is dull, routine, and repetitive and over which they will have no control. To a large extent the work force internalizes the attitudes and behavioral traits appropriate to its place in capitalist production.



Education for Capitalist Production

While it would appear that the major function of the educational system is socialization-to one's place in the society and the workforce, it also serves the needs of the production system by attempting to provide future workers with at least some of the basic skills needed to do their job. The content of education, some of which is also oriented to socialization, includes work on skills that may be useful in the workplace. That schools may not have done enough of this in the past to satisfy the needs of the capitalist production system may explain the recent emphasis on career education at all levels of schooling, including higher education.

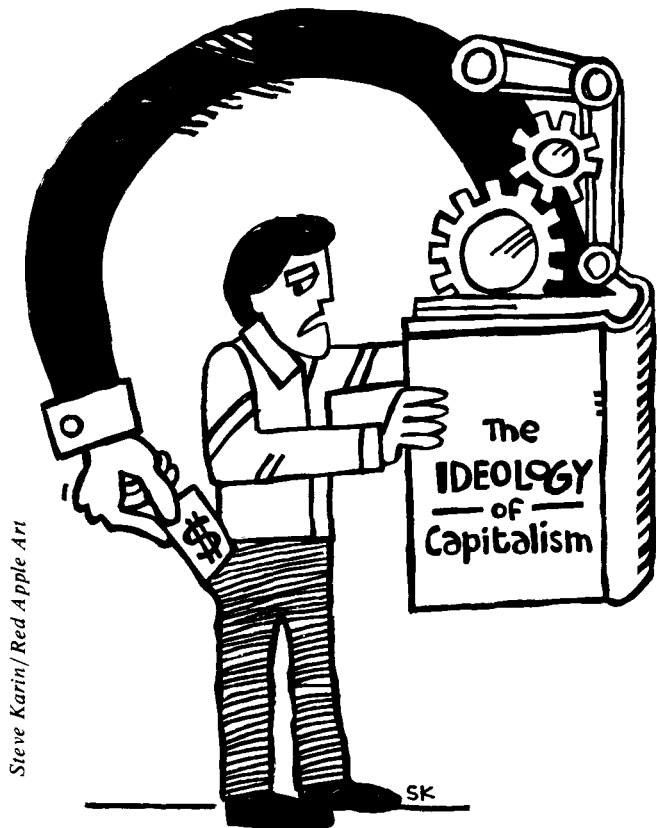
Again, the content differs as well as the form, with vocational schools for the working class, community colleges and state colleges, focusing increasingly upon vocational subjects, for the working class and lower middle-class students, and the elite private colleges and universities and a few state universities for preparing middle- and upper-management. To a large extent the increased emphasis on career education probably represents another step in further public subsidization of the educational needs of capitalist production. The college graduate of the sixties was found to be in need of a considerable amount of on-the-job-training before her/his labor could provide an adequate profit, or surplus value. With an increased need for service and production workers having low-to-middle-level technical skills, the capitalist economy has placed an added demand on the educational system.

Education and the Changing Needs of Capitalism

The history of public subsidization of capitalist production through education is traced by Bowles and Gintis. They argue that the change from an entrepreneurial capitalism to its modern corporate form was reflected in educational policy and theory (p. 63).

Looking at the growing mill town of Lowell and the rapidly industrializing state of Massachusetts, they connect the birth of the factory system with the nineteenth-century common-school movement which molded mass education (Chapter 6). The demands of the mills and factories for large numbers of disciplined workers meant that a large percent of children would become the laborers in the factories. "The structure of employment was changing drastically: between 1820 and 1840, the percentage of the work force engaged in agriculture fell from 58 to 40 percent; by 1850, the percentage would fall to 15 percent. Employment in manufacturing was growing correspondingly" (p. 165). Bowles and Gintis observe that a stable body politic and a smoothly functioning factory alike required citizens and workers who had embraced and taken on as their own the values and objectives of those in authority (p. 170). Schools were the means to inculcate those values.

Mass education prepared the large numbers of workers needed for the mills and factories. Making it compulsory assured that all future workers would be exposed to these values and accustomed to the social relationships of dominance and subordination in the economic system. The graded school, in which children were grouped according to proficiency as well as age, reflected the principle of the division of labor and the perceived inequalities in positions. Later, tracking systems would insure and legitimize the unequal divisions of labor and position. Finally, by making the system public, the bulk of its cost was borne by the working class rather than by the owners.



Progressive Education

In looking at the period 1890-1930, Bowles and Gintis make the point that progressive education was born in a decade of labor strife and was fueled throughout its course by social unrest and the specter of political upheaval (p. 180). This was also the period of the expansion of corporate capital. Under the influence of a corporate economy, the objective of the school reformers was to centralize control of urban education in the hands of experts (p. 187) thus removing it further from the direct expression of grass root impulses.

Their reforms ushered in an era of tight top-down control, paramilitary discipline, and substantial independence from popular control. Bureaucracy became the watchword of the schools. (p. 189).

It was under the Progressive movement that secondary schools developed different educational (curricular) tracks, and that testing was pushed by the eugenicists for the purposes of educational tracking.

Another function of the educational system is credentialing. Educational credentials play an important role in the maintenance of hierarchical authority.

Employers find it desirable to vest hierarchical authority in well-educated workers, not only because higher levels of schooling may enable an employee to better do the work at hand or because the more-educated seem more fit by their demeanor to hold authority, but also simply because educational achievement — as symbolized by one sort of sheepskin or another — legitimates authority according to prevailing social values. (p. 82)



The obtaining of the credential, or even one's continued involvement in education in terms of continued personal subjugation to or acceptance of the process, also represents a form of cooptation. In a sense, it may be viewed as paying one's dues to a system leading to feeling that one must plug into the system to reap the benefits for which the dues were paid. The period of the Sixties, with the dropping out of some middle class youth, represented a degree of rejection of the system. This was relatively short-lived because of the tightening of the economy. Today's youth is no less alienated or frustrated, but economic necessity has demanded a reaccommodation to the system. The tighter job market

has if anything increased the importance of the credentials in making them a greater factor in the artificial division of labor and as a criterion for employment. Many older workers, particularly in service jobs, are finding that they suddenly need the piece of paper just to hold onto the job that they may have already been performing for years. This trend also serves the needs of the higher education system which can now compensate for the drop-off in the number of traditional college-aged students by an increase in adult education.

Finally education is supposed to contribute to personal development and societal betterment. The concern is not for realizing the individual's potential and creating a more equal and just society, but for the maintenance of an economic system with its mandated inequalities and personal limitations. To the extent that the educational system is responsible for the instilling and nourishing of values, it is those values — conformity, competitiveness, self-centeredness — which are supportive of a profit-oriented system based on inequality, rather than the values — autonomy, cooperation, and common interest — which would underlie a more just and equitable economic and social system.

Need for Structural Economic Change

For change to occur, Bowles and Gintis recognize that the necessary changes cannot be limited to the schools or the work place, but must entail a radical transformation of the very class structure of U.S. society. They suggest

that movements for educational reform have faltered through refusing to call into question the basic structure of property and power in economic life. . . . the key to reform is the democratization of economic relationships: social ownership, democratic and participatory control of the production process by workers, equal sharing of socially necessary labor by all, and progressive equalization of incomes and destruction of hierarchical economic relationships. This is, of course, socialism, conceived of as an extension of democracy from the narrowly political to the economic realm. (p. 14)

Bowles and Gintis stress the need for a revolutionary class consciousness:

The overriding strategic goal of a socialist movement is the creation of working-class consciousness. (Bowles and Gintis, p. 285)

The last part of *Schooling in Capitalist America* is devoted to examining the question of change for "an equal and liberating education system which can only emerge from a broad-based movement dedicated to the transformation of economic life (a socialist movement)" (p. 266). Most of this part of the book is an analysis of

the conditions for a socialist movement, but it also provides some guidelines for organizing and struggle. For the educator, Bowles and Gintis do have some suggestions:

Even within the classroom, the dissident teacher can become an effective subversive through teaching the truth about society; through inspiring a sense of collective power and mutual respect; through demonstrating that alternatives superior to capitalism exist; through fighting racist, sexist, and other ideologies of privilege through criticizing and providing alternatives to a capitalist culture (p. 274).

However, the movement is not going to succeed on the basis of individual actions or the actions of a particular stratum of the working class. One of the lessons of this book, and a major part of their analysis of strategies for social change, is that the struggle proceeds on principles of unity, equality, and cooperation of a broad-based movement comprising students, parents, workers, and community members.

Need for a Broadly Based Movement

While the classroom may be a good setting for fostering a critical consciousness and cooperative behavior, we must remember that learning is not confined to

our schools or to a particular age group in our population. We are all learners and learning continues throughout our lifetimes. Because of the repressive nature of the capitalist educational system, learning and actions outside it may be more important for the struggle for revolutionary educational change as well as for social change in general. As participants in such a movement, we must engage ourselves with others in their progressive struggles as well as our own. □

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LETTERS

(continued from page 6)

We were also thrilled to hear that everyone here is "better off" than their peers in socialist countries. We understood that California was pleasant, but we were unaware that you had eliminated unemployment, racism, poverty and catastrophic health costs out there. Congratulations! Oh, by the way, what exactly do you know about those "workers paradises"? Probably about as much as they know about the U.S. You would like to discuss oppression, Jim? Why leave out those bastions of the "free world", South Africa, Argentina, South Korea, Brazil, Taiwan and Chile? The point is not to construct a catalog of capitalist versus socialist horrors and then to use that as an excuse for doing nothing. The point is to exercise our brains as well as our backs in the construction of a society whose goal is the fulfillment of human needs. Part of achieving that end is understanding how and why this society functions as it does. If that is boring to you Jim, it may be simply because you really don't care about anyone else. Too bad Jim, too bad.

News Note

INVESTIGATING MENSTRUAL CRAMPS

Many who suffer menstrual cramps and the accompanying nausea and headache have grown used to hearing advice such as take two aspirin and try to relax. Since the cause of the painful symptoms, called dysmenorrhea, is generally considered mysterious, therapy is neither rational nor specific. Birth control pills are presently the most effective treatment, but this presents several disadvantages — it requires taking pills 21 days for a problem that appears only one or two days; the pills also carry the same risks as when used for contraception. As long as dysmenorrhea has a mysterious cause, its treatment can never be rational.

But clues needed to solve the mystery surrounding its causes began to appear 15 years ago. Even though an estimated 30-50% of women — that's up to a quarter of the total population — suffer from menstrual cramps, it's been a 15-year journey from the first hints that the symptoms have a biochemical origin to the pinpointing of the agent responsible.

The chemical culprits are prostaglandins, hormones made in the

uterine lining, which are powerful stimulators of smooth muscle contraction. Smooth or involuntary muscles line such organs as the uterine wall, the intestines, stomach and blood vessels. Their contraction leads to the cramps, headaches and feelings of nausea which afflict many of us one or two days a month. It is the prostaglandins which initiate uterine contractions and so cause the lining of the uterus to slough off during menstruation. As the lining goes, so does the source of prostaglandins. The symptoms of dysmenorrhea appear when levels of prostaglandins are higher than average.

Treating menstrual cramps by giving birth control pills works because the pills reduce the amount of uterine lining, hence cut down on the production of prostaglandins. Specific inhibitors of prostaglandin synthesis are now marketed as treatment for arthritis under the names of ibuprofen (Upjohn), indomethacin (Merck Sharp and Dohme), mefenamic acid (Warner-Lambert), and naproxen-sodium (Syntex). These products seem to be free of side effects except in people with asthma or gastro-intestinal ulcers.

—info from *Science*

Testing: The Competency Controversy

by Pamela George

Educational testing in America has become a cradle-to-grave arbiter of social and economic mobility. Tests determine who succeeds and who fails, who receives remedial or enrichment services, who goes to college or graduate school, who has his or her way paid, and who practices medicine, law or the other prestigious occupations.

In perhaps the ultimate expression of their power, tests are now being used to reduce 12 years of public education into a set of specific questions which, if answered correctly, entitle a student to a high school diploma, the traditional ticket to upward mobility in America. Students who fail these competency tests may receive certificates that they attended school but no official statement that they mastered the basic skills of reading and mathematics. Officially, they are labeled "incompetent."

The movement to test students' competency as a minimum basis for awarding high school diplomas is growing steadily across the nation. Forty states have begun or are planning testing programs, partly from the belief that testing of essential skills will raise academic standards and increase educational achievement.(1) Strategies for administering competency tests vary, but in most cases high school students take the test in the fall or spring of their junior year. If they fail on the first try, they can take the test in the fall and/or spring of their

senior year. Some states have current or pending legislation which provides for remedial instruction services for the students who fail.(2)

Taken at face value, the idea that competency testing can assess basic skills and improve educational achievement is immensely appealing. Children should learn basic reading and calculation skills in 12 years of publicly financed education. Indeed, as early as the 1840s one state — Massachusetts — began requiring students to pass a test in order to graduate from high school. (3) In the 1870s, the New York legislature ordered schools to "furnish a suitable standard of graduation."(4) By the turn of the century, educational psychologists like E.L. Thorndike were advocating tests as a means to improve the quality of education: "We may not hope to achieve progress," said Thorndike, "except as . . . measuring sticks are available or may be derived."

In addition to this long-standing dependence on testing, a number of factors have fueled the current drive to install competency exams in American schools:

- **A desire for more scientific management.** Despite more than a decade of unsuccessful attempts to apply controls from the business world to the educational arena, enthusiasm for competency tests stems partly from the belief that scientific management can improve the schools. The desire is to make schools more "accountable" and "businesslike," more subject to "system analysis, planning models, budgeting-systems, and cost-benefit analysis."(5) Most of these proposals, modeled on industrial traditions of problem solving, ignore the complexities of the U.S. educational system.

- **A shift of attention from equality in educational opportunity to excellence of academic achievement.** Schools still discriminate on the basis of race, economic status, handicaps and sex; but policymakers have turned

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This article appeared in a special issue of Southern Exposure (Vol. VII, No.2, Summer 1979), "Just Schools," which explores the progress made and problems remaining in the 25 years since the Brown vs. Board of Education decision. Southern Exposure is a quarterly, available at \$10/year individuals, \$12/year institutions, from P.O. Box 230, Chapel Hill, NC 27514.

from the issues of equality raised in the 1950s and '60s to a greater concern for making educational instruction efficient and effective. Many observers, like Arthur Wise, call this conservative goal "a reaction to efforts to equalize the distribution of educational opportunities and resources."

- **A rise in public concern over burgeoning costs.** More than one-third of the annual expenditures of state and local government goes for education.(6) Increasingly, taxpayers are demanding proof of the return on this investment; consequently, policymakers call for more testing to verify the system's performance.

- **An increase in the role of private business in education.** A plethora of test development companies, consulting firms, curriculum suppliers, technical advisors and testing experts have enjoyed a monetary windfall from servicing the growing educational establishment. They encourage the notion that competency tests are needed — and they profit accordingly. For example, a hefty proportion of the one million dollars spent to develop and test North Carolina's first exam went to McGraw-Hill Publishing Company. The test companies profit further by marketing "remediation kits" to failing students, harassed teachers and anxious parents.

- **Parents' fears about their children's employment future.** Figures for the unemployment rate among youth 17 to 20 range as high as 22 percent for whites and 52 percent for blacks. Parents hear these numbers as well as predictions of more inflation and/or recession, and they turn to competency testing as a means of certifying that their child can read and calculate, and thus compete more successfully on the job market. Of course, the premise behind this logic is that large numbers of *other* children will be certified as "incompetent."

The prospect of officially labeling young people as incompetent raises serious concern among many educators and parents. They fear that the tests will disproportionately affect the poor, cultural and racial minorities, and the disabled. In calling for a moratorium on competency testing, they have identified a number of critical problem areas with the tests:

- **Accountability problems: who's responsible for the failure?** In North Carolina 51 percent of the high school juniors failed the first minimum competency tests given in 1978. In Florida, the failure rate was 36 percent on the 1977 test. Recent tests still produced failure rates (17 and 15 percent respectively) that indicate hundreds of thousands of students nationwide will fail to meet this prerequisite for high school graduation.

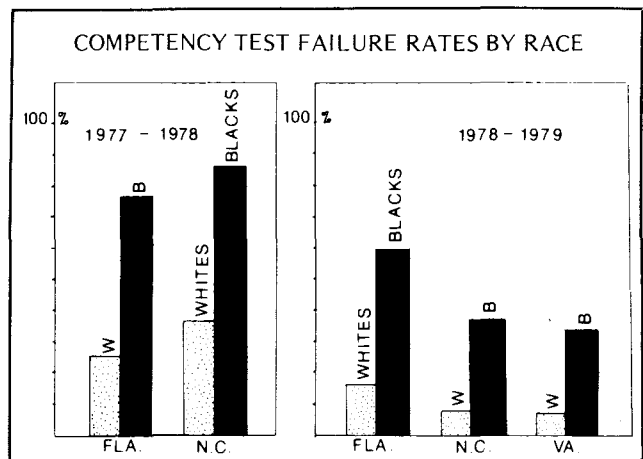
These test scores suggest a gross failure of the schools to educate. But rather than view the scores as proof of the need for a greater public commitment to education, current use of the numbers places the full burden of unsatisfactory performance upon the student. Competency tests "blame the victim" by making students pay for the failure of the entire educational

system. Ironically, while the demand for competency testing grows, new federal legislation for handicapped children puts the burden of responsibility for a child's learning on the educational institution, not the child. The concept of "zero reject" contained in the new law for special education for handicapped children — i.e., a teacher cannot opt out of teaching a child to read because the child may have some learning idiosyncrasy — does not apply, according to the philosophy behind competency testing, if the child is "just" poor or black. The system assumes responsibility for some children, but not others.

Some teachers' unions also oppose the shift in accountability which competency tests symbolize. They fear the tests may be used to measure the teacher's performance, blaming the instructor rather than the school system for the high failure rates. The tests may then become the basis for making employment, promotion and merit pay raise decisions.(7) Unions and individual teachers voice a justifiable concern that they may become scapegoats for the low scores in a given school or school district.

The central accountability question remains: who should be held responsible for the failure of large numbers of students to demonstrate basic reading and math skills? The competency test may do more to obscure this valid question than to clarify its answer.

- **Racial and cultural problems: the new segregation?** Though policymakers and educators supporting competency testing emphatically deny any cultural bias in the tests, opponents note that competency testing did not become a concern until schools were desegregated. Some black parents suspect that one goal behind this new movement to "protect standards" is resegregation within supposedly integrated schools. Whether resegregation is an intended or unintended consequence, regrouping of students based on test scores is likely. Such "tracking" will particularly affect black and poor children, since their scores are lower than their white



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and more affluent classmates. A 1976 Southern Regional Council report predicted that "tracking based on competency test results may become the new segregation" in Southern schools.(8)

In North Carolina in the spring of 1978, 85 percent of the black students taking the tests failed, while 37 percent of the whites failed. Similarly, the Florida scores showed that 77 percent of the blacks failed compared to 24 percent of the whites. In the most recent tests, which were adjusted in difficulty, the ratio of black-to-white failure has actually increased: 36 percent of the black students taking the test in North Carolina failed, over five times the failure rate of whites; 60 percent failed in Florida, almost four times the white failure rate. Results of the first testing in Virginia demonstrate the same discrepancy, with the proportion of blacks failing the test five times higher than that of whites.

The high failure count also affects educational opportunities for those minority students not labeled incompetent. In many state universities, admission quotas are based on the black-white ratio of graduating high school seniors in the state. The new high school graduation rosters, based on those who survive the competency test, will significantly alter the black-white ratios, and as a result, fewer — not more — minority students will be admitted to traditionally white universities.

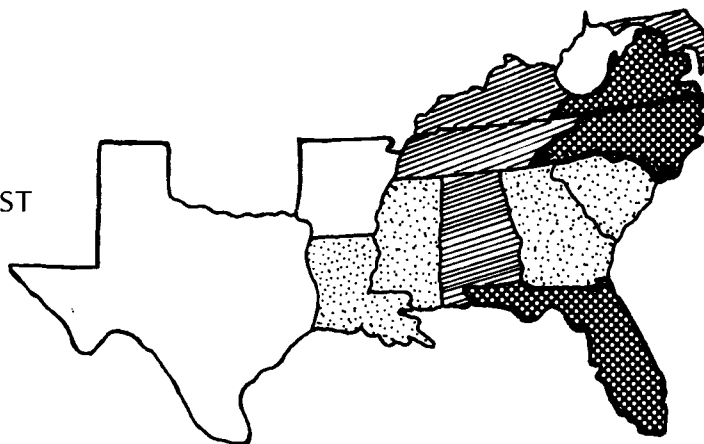
Another controversial issue related to the test's racial and cultural bias is the way the high failure rates coincide with the increasing demand for a low-wage pool to attract industry to the South. Last year, in a symposium at the University of North Carolina, an economist with Burlington Industries, the state's largest employer, argued that the main reason North Carolina had the lowest average industrial wage in the nation was because it has a low "per capita level of educational attainment." Though it probably does not take a high school diploma to monitor shuttles on a Burlington loom, the competency test criterion can be used by com-




panies like Burlington to justify continued low wages. Partly as a result of this link between per capita educational levels and industrial wages, parents have seen the competency tests as a mechanism to ensure their children jobs. In fact, what may happen is that the "failures" will be hired at lower wages, pushing out the more "competent" students. The competency testing movement thus is aimed toward two contradictory goals: industrial pressures for lower wage rates and placation of middle-class fears about unemployment.

• **Technical problems: what competencies, what minimum?** For a minimum competency exam to be fair, the school curriculum must be designed to teach the skills being tested. But the test's proponents argue that a child should be able, for example, to compute the most economical size of a grocery item, to use the yellow pages, or to understand a tax form — all skills which may not be directly taught in school. This is, of course, unfair; it may also be illegal. Merle McClung of the Center for Law and Education says that if a diploma is denied on the basis of subject matter never taught, such a denial is a violation of due process of law.(9)

Opponents of the exams also say students have not received sufficient prior notice that scores on competency tests will determine whether or not they graduate. In North Carolina, Florida and Virginia, eleventh graders were told only last year that they had to pass the exams in order to get a diploma. McClung argues that traditional notions of due process "require adequate notice of any rule which could cause irreparable harm to a person's educational or occupational prospects." The introduction of tests as graduation criteria does seem to change the "ground rules" after students have completed 10 or 11 years of school. Already, two class action suits (see box) claim that inadequate prior notice violates the Fourteenth Amendment, which safeguards individual rights and guarantees the due process tradition.

COMPETENCY TEST PROGRAMS IN THE SOUTH



-  programs in operation
-  programs legislated
-  programs planned

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Yet another technical problem with minimum competency testing is the obvious subjective, and perhaps arbitrary, basis for assigning cut-off scores to divide those who pass from those who fail. The average cut-off score for passing the tests is 70 percent. However, by adjusting the difficulty level of the tests' items, administrators can pass or fail as many students as they want. So the value judgments underlying the setting of cut-off scores are not clearly recognized, or at least are not made clear to parents. One critic warns that no amount of elaborate statistical data can do away with the subjectivity involved in setting what "minimum competency" should be.(10) The decision is clearly as much political as scientific.

• **Drop-out problems: a flight from the tests?** Whenever the cut-off point is set, failure and the threat of failure will affect the school drop-out rate. In North Carolina in 1978, over 15 percent of the high school sophomores dropped out in the summer before their junior year, shortly before the administration of the first competency test. Educational policymakers chose to give the exam in the first semester, directly after large numbers of discouraged students, who might boost the failure rates, left school. *Time* reported the flight of Florida high school juniors who failed the test to nearby Georgia schools where no competency test criterion is used for graduation.

• **Problems of remediation: compensatory education revisited?** In the haste to implement competency testing programs, the remediation efforts designed to help failing students have been poorly planned. To date only eight states have begun bonafide, planned remedial instruction program. Funding for these remedial services is limited. The North Carolina legislature voted only \$4.5 million for remedial efforts following the 1978 spring exam. This allocation translates to less than two extra teachers per district. Florida's Compensatory Based Education Act of 1977 provided \$10 million for remedial programs. In both cases the sums are inadequate in view of the large number of students needing additional instruction.

In addition, remedial programs will have to be significantly more effective than special education or compensatory programs have been in the past, if they are actually to reeducate the large number of students who fail the tests. The *Tampa Tribune* reported that at one Jacksonville high school only nine percent of the students passed the competency exam. Remedial services for so large a mass of students will very likely be impossible. One North Carolina principal confided, "Nobody's going to check on the remedial programs, so you fake it and say, 'Sure, we're doing remediation.' "

Even if remedial programs were adequately funded and were implemented by trained and skilled teachers, providing adequate remediation would be difficult. Students who after 12 years have not mastered the cumulative basic skills required by the test are unlikely

to acquire these skills in one session of summer school or in a weekly, optional reading lab. The critical question remains whether short-term remediation can compensate for the failure of schools to teach basic skills in the previous 11 years.

Judicial Action in Opposition to Testing

In October, 1978, ten Tampa-area students filed a class-action suit challenging the legality of Florida's competency testing program. The suit alleged that the test violates their rights under the Fourteenth Amendment to equal protection under the law. The students claim that the tests perpetuate practices of racial discrimination which have historically been present in Florida. They charge that they were subjected to segregated schools which continue to persist despite the 1954 *Brown v. Board of Education* decision.

The students further contend that much of their schooling has been inferior and wrought with discriminatory practices. They argue that the testing perpetuates these biases.

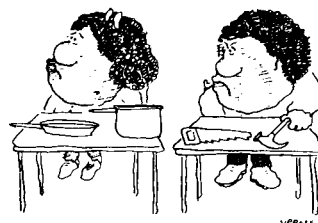
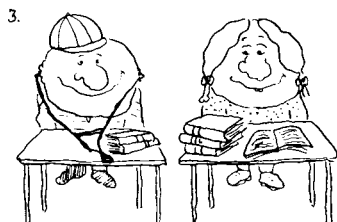
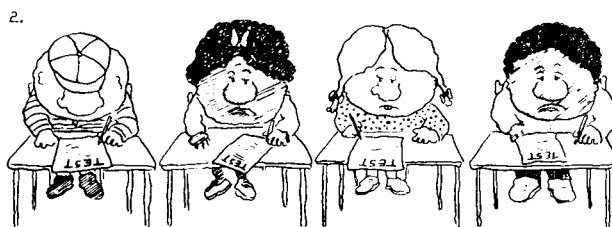
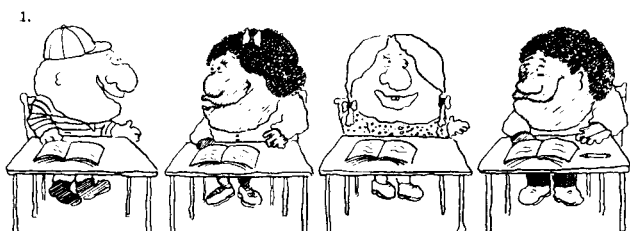
U.S. District Court Judge Terrell Hodges has disqualified himself from hearing the lawsuit. No action has been taken on the case since the fall.

Meanwhile, the Florida NAACP and North Carolina NAACP have filed suits alleging racially discriminatory intent in their respective state's testing programs. No action has been taken on these cases to date.

• **Administrative problems: bureaucrats as educators?** The logic of minimum competency testing includes the assumption that schools operate as a bureaucracy. The testing program, designed by the educational bureaucracy, specifies the goals the schools must attain. Bureaucratic structures plan, monitor and evaluate what goes on in the school, reinforcing the drift toward the centralization of educational decision-making away from the classroom into the higher levels of government.

The expanding bureaucracy, coupled with the actual expenses of testing, also makes the cost of education soar. It has been conservatively estimated that the minimum competency testing programs will cost about \$50 million annually.(11) Hidden costs to school systems not fully accounted for in the figure include possible legal challenges and the high price of remedial instruction. Significantly, these millions will be spent on testing and the testing bureaucracy rather than on implementing more effective teaching methods, such as reduced teacher-child ratios in the classroom.

Alternatives to the present competency testing movement do exist. These vary in desirability and manageability but serve as antidotes to the deleterious effects of competency tests.



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- **Reallocation of responsibilities.** Federal and state government should be primarily concerned with promoting equality of educational opportunity. When local schools discriminate on the basis of race, economic status, sex or disability, higher levels of government intervention are needed to redress the imbalance. Local governments, boards of education, consumer groups and school staffs should determine educational goals for their communities and evaluate the attainment of those goals.

- **Retarget the tests.** The present use of competency tests as high school exit exams should be halted. Standardized tests could be used to *audit* the performance of systems, rather than the achievement of individual children. Test results, gathered as statistical evidence, should be reported in such a way that the stigma of poor performance is removed from the student, and the burden of improving teaching methods and materials is placed on the educational professional and policymaker.

- **Rethink educational evaluation.** We must begin to act on the long professed belief that educational evaluation is much broader than the concept of measurement. A systematic monitoring of what goes on in the classroom would prove considerably more helpful than the students' answers to a series of questions. Supervisors, researchers and evaluators dedicated to upgrading performance must identify poor learning and poor teaching in the classroom, and inform teachers of ways to improve their effectiveness.

Education has always been vulnerable to the "trial and error" appetite of educational consultants. Educators, as a professional group, seem to exhibit a desperate insecurity easily exploited in public discourse and media brouhaha. Characteristic of this insecurity is their peculiar responsiveness to movements and fads perpe-

trated by an education industry which profits from gimmicks and faddism. Hordes of experts hawking technologies and tests make the rounds, promising panaceas from public criticism. The fad of competency tests has now achieved the status of law in a majority of the 50 states and is in "full-steam-ahead" implementation in the South. Those who question their awesome consequences are brushed aside as obstructionists or worse. But on closer examination of the short- and long-range effects on the lives and learning of our children, it seems clear that the "costs" of using competency tests, as they are presently being implemented, far outweigh their "benefits." □

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Resources for Teachers

SCIENCE FOR THE PEOPLE MATERIALS

Science and Liberation, edited by R. Arditti, P. Brennan and S. Cavrak. Boston: South End Press, 1979 (\$5.40). Collection of essays on the role of science and the scientist today. Sections cover: the myth of the neutrality of science, science and social control, working in science, and new approaches to science teaching and working. The authors are from a variety of fields and the editors are active members of Science for the People. (Available from SftP office.)

Sociobiology Packet, edited by the Boston Science for the People Sociobiology Group. Cambridge, MA: Science for the People, 1978 (\$3.00). Collection of articles critiquing sociobiology and examining its political implications. Useful for teachers because it reviews theories and arguments for and against sociobiology. (Available from SftP office.)

Science for the People — special issue on Science Teaching. Vol. 4, no. 5, Sept./Oct. 1972. (\$.50). Contains course descriptions, articles with political punch. Is still timely and includes additional resources. (Available from SftP office.)

PERIODICALS

Edcentric: A Journal of Educational Change, published quarterly. P.O. Box 10085, Eugene, OR 97440. \$5.00 individuals, \$10 for institutions.

Edcentric criticizes the formal education system and encourages changes in schools. It tries to bring together teachers to share experiences and develop cooperative community action. Recent articles published covered the Bakke case, gay rights in education, and teaching about nuclear power.

Politics and Education is published bimonthly at 285 Court St., Middletown, CT. \$10 per year. It is a publication that reports on activist movements on college campuses across the country, and analyzes current issues, strategies for change, and visions of alternative forms of education. Articles in recent is-

ues dealt with the reinstatement of the draft, apartheid movement on campuses, science and sexism, and nuclear weapons research.

Radical Teacher, published quarterly by Education in These Times, P.O. Box 102, Kendall Sq. P.O., Cambridge, MA 02142. (\$2/issue.) View of education from social, political, and economic perspective. Includes recent educational trends, politics of reform, personal accounts, etc. Short, informative articles.

Working Teacher, published quarterly by the Working Teacher Education Society, Box 46534, Postal Station G, 3760 W. 10th Ave., Vancouver, BC, Canada. (Subscription \$5.00/year.)

GENERAL

Food for the Health of It. Project Outside/Inside (see above entry), 1978 (\$5). Senior high school unit on nutrition and the politics of food.

Food First, Beyond the Myth of Scarcity, by F.M. Lappe, Joseph Collins and Cary Fowler. Ballantine Books, 1978 (\$2.75). Question and answer sections on topics such as modernizing hunger, the inefficiency of inequality, the trade trap, the myth of food power, and self-reliance.

The Problem Exists in the Classroom Because it Exists in the World. Cooperative Schools Group on Development Education, 121 Avenue Rd., Toronto M5R 2G3, Canada, 1978. Issues and approaches centered on the causes and experiences of underdevelopment which force people to leave their home countries.

Design for Health. Project Outside/Inside, 81 Highland Ave., Somerville MA 02143, 1978 (\$5). A junior high school 6-week unit on fitness, self-image and weight control; there's a section on women and sports and the effects of advertising on self-image.

The Door Is Open, But The Ride Ain't Free, Anthropology Workbook by the Badlands Anthropology Collective, University of Northern Colorado, Greeley, CO. Also available from Burgess Publishing Co., Minneapolis,

MN. Workbook written and designed for an introductory anthropology course. It presents material on racism, biological determinism, and sexism from a radical perspective.

Danger: School! IDAC Document 16/17 (from a series published quarterly, subscription \$8/year). IDAC, 27 chemin des Crets, 1218 Grand-Saconnex, Geneve, Switzerland. The Institute of Cultural Action's innovative examination of the school as the ever present institution of modern industrial society. Contains superb graphics where a picture is worth a thousand words.

A Primer of Libertarian Education, by Joel Spring. New York: Free Life Editions, 1975. Simple, easy-to-read exposé on the development of radical educational theories of the 19th and 20th centuries; included are anarchism, Marxism, and the Freudian Left in confrontation and contradiction with present and future societies.

WOMEN

Women Look at Biology Looking at Women, edited by R. Hubbard, M.S. Henifin and B. Fried. Cambridge, MA: Schenkman Publishing Co., 1979. Looks critically at myths and stories told about women's evolution and biology. Separate chapters deal with history of women in medicine, child birth, menopause, menstruation, etc. Also includes detailed bibliography.

Sex Role Socialization: A Focus on Women. Palo Alto, CA: Mayfield Publishing Co., 1979. Deals with sex role socialization from early childhood through school years and college. Discusses how stereotypes begin before school and are perpetuated throughout the educational system.

GOOD READING VIA MAIL-ORDER

Until recently, not all science activists have had access to a comprehensive full-spectrum progressive political bookstore. **Modern Times Bookstore** (3800 17th Street; San Francisco, California 94114) has produced an excellent catalog (\$1.00/copy) that includes sections on all of the basic progressive issues of the day. Of immediate interest to *SftP* readers will be sections on food, health, science and technology, and energy and ecology.

Dick and Jane Meet Scientific Man

An Analysis of Reading Management

Most of us remember relatively little about learning to read. It involved little books with a pretty picture and a few short words on each page. For some of us, there was a lot of rhyming of words, like “hat-cat-fat”; only many years later did we learn that this was called “phonics.” Some of us found it pretty traumatic, while others breezed through. But one way or another we learned, and the details of *how* we learned have mostly faded from memory. I remember “Run, Spot, run” and “See the ball”; but other than that — well, I was very young at the time.

In recent years, some of us have begun to be concerned again about that process, and not merely as elementary school teachers or parents. First of all, we have realized that more was being taught than just reading. A feminist political analysis can point out the role of those pretty little books in giving us our ideas of gender roles — of how Mommy and Daddy, Dick and Jane are supposed to behave. And those innocuous little phrases included such concepts as “Some people can learn a lot. Some people can only learn a little.”(1) We were being taught, unknowingly and perhaps even unintentionally, to accept the basic differences in social status that characterize modern capitalist society.

Traditional teaching materials portray sex-role and class stereotypes characteristic of capitalism. The new technique of scientific management to teach reading offers a more blatant example of how teaching methods reinforce the status quo: the use of this prescribed and inflexible method limits teachers’ creativity in the classroom, communicates to parents and students that the

responsibility to learn, and to learn in this one way, lies entirely on the student, and legitimizes itself through a scientific rationale. This article outlines these abuses of scientific management and centers on its violation of the teacher’s role.

Taylorized Teaching

But the influence of capitalist thought on Dick, Jane and Spot goes beyond the question of *what* is taught. It also has a great deal to do with *how* reading is taught. This becomes particularly clear when we look at the recent introduction into the classroom of techniques first developed in industry around the turn of the century. The little red schoolhouse does not have assembly lines and factory whistles, at least not yet, but more and more it is becoming another experiment in scientific management.

Scientific management, also called Taylorism after its most famous exponent, Frederick Taylor, is generally associated with time-and-motion studies. One breaks up the productive process into the basic motions a worker has to perform, calculates the minimum amount of time needed for these motions, and then forces the worker to do the job in the most “efficient” way. However, scientific management’s importance in capitalist development goes well beyond these charges. As analyzed by Harry Braverman in the book *Labor and Monopoly Capital*(2), scientific management was the harnessing of science by capitalism, for the purpose of taking all control of production away from workers. Jobs that involved expertise and knowledge on the part of workers were subdivided into parts or mechanized, so that skill was no longer necessary. Quantification and standardization ensured that all work would be done in

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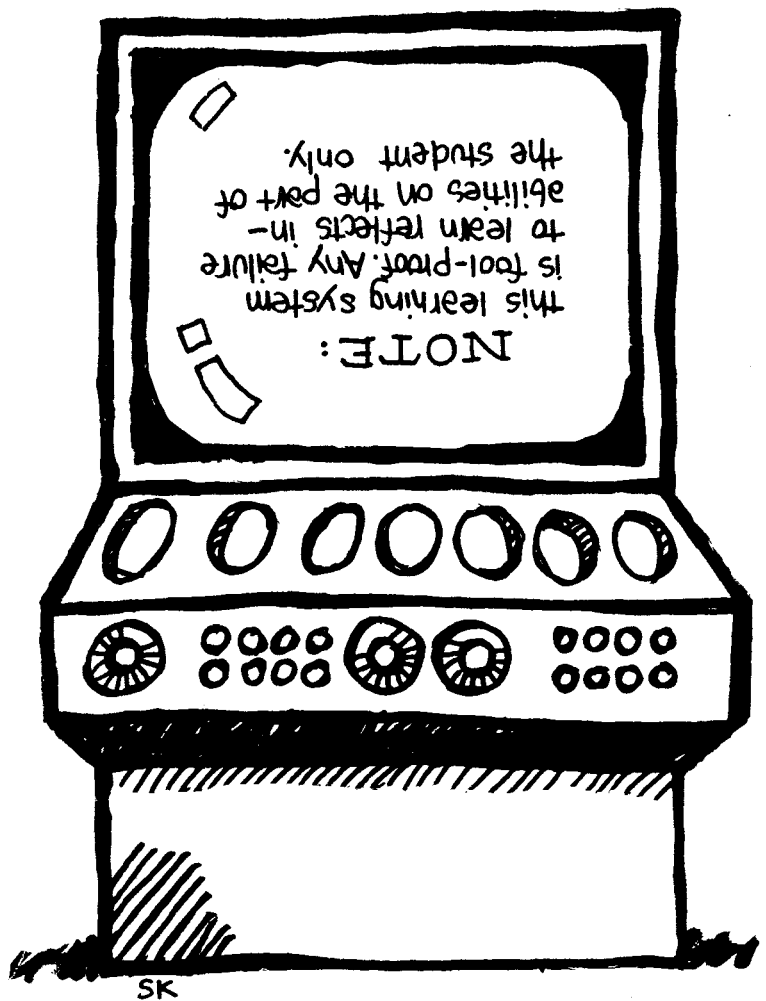
gement Systems

by Doug Boucher

the same way and at predictable rates; thus raw material needs and output of products could be carefully controlled. No longer would skilled workers have the power that comes from having knowledge and talents that the factory owners couldn't do without. Rather, the subdivision of the productive process would both make it possible to replace skilled labor with unskilled, and guarantee that only the top managers would have the knowledge necessary to understand the complete process of production.

Braverman shows how the principles of scientific management, having completely transformed industry, are also being introduced into "white-collar" jobs such as typing. The point is not that scientific management is simply a more "efficient" or "productive" way of organizing work (although of course it generally is, if one accepts capitalism's way of defining efficiency and productivity), but rather that it is a way of organizing work that is adapted to the needs of capitalist production. Thus it can be employed in the control of workers and the "manufacture" of essentially anything that is considered useful in our society — cars and corn flakes, laundered shirts and letters, blueprints and bombs.

Or, children who can read. While the raw materials are somewhat variable, and the workers tend to interact with them a bit personally, these give no reason to think that science can't reorganize things in the same way that it did in the steel mill. And in fact, the companies that make reading materials have gone well beyond an improved "See Jane run." They have developed entire "management systems" for teaching reading, complete with textbooks for all elementary grades, pre-tests and post-tests, fill-in-the-blank workbooks, teacher's guides, test manuals, and supplementary reading. But more than just printed matter, they are selling a way of



Steve Karian/Red Apple Art

organizing the teaching process. As a computer programmer might put it, they are selling schools the software for learning to read.

The reasons schools are buying, and the implications for teachers and students, are demonstrated in a recent set of articles on the Ann Arbor, Michigan schools reading program, written by Kathy Hulik in the *Ann Arbor News*(3). Ann Arbor, a fairly wealthy university town with a school system which is considered forward-looking and innovative, recently bought "management systems" from four major publishers. (Ginn, Holt, Houghton-Mifflin and Laidlaw), at a cost of over \$85,000. The systems will be implemented fully in September 1979, and while teachers can choose which of the four to use, they must use essentially the whole system "package" for the one they choose. About 8,000 pupils in grades one through six will be learning reading through the management systems.

Scientific Management and the "Art" of Teaching

Hulik's articles indicate that both teachers who favor the management systems and those who oppose

them, agree in their analyses of why the school district is using them. Thomas Pietras, the district director of language arts, explains that "The management system is basically record keeping." The textbooks are divided up into units, each teaching a certain "skill," and tests before and after each unit indicate when a student has learned a certain skill and can go on to the next unit. Beyond simply reading the books (in groups of students, all at the same skill "mastery" level), the students spend their time filling in blanks in workbooks which are similar to the tests. The workbooks and of course the tests are graded by the teacher, and provide a quantitative measure of exactly how many "reading skills" the child has learned. One management system, for example, is advertised as containing 450 distinct skills.

Some teachers question whether many of these "skills" are in fact valuable in learning to read. For instance, one of Houghton-Mifflin's workbooks asks the student to pick out the nonsense phrase that rhymes exactly with an underlined word in a sentence. Thus, given the sentence "We made the candy with instant fudge mix," one should know that the proper rhyme for "instant" is "win stunt" rather than "inch ant" or "fan stand." But irrespective of the value of each particular exercise, it is clear that the basic purpose of scientific management remains. Rather than allowing teachers to teach in their own individual ways, the management system divides the process up into its smaller component parts, and deals with them one at a time. Teaching is standardized. As one proponent of the system puts it, "Reading is no longer taught according to an individual teacher's preferences." Another teacher who favors the system says that "there is a systematic section of each day a teacher can plug into." This is considered to be particularly useful to young teachers, as yet unskilled in teaching reading.

The Significance of Standardization

Even more important than standardizing teaching is making it quantifiable. The tests and workbooks both indicate skills an incoming student has mastered and provide something to show parents and administrators to indicate progress. One advocate of the method says that "When discussing a child's performance with his parents, the parents don't want the teacher's subjective judgments, but objective facts." Another explains that "There is security in knowing the children have been exposed to all the skills, that the basic components of a good reading program are being attended to."

It is revealing that the claim for the management system is not so much that it quantifies *learning* (which, after all, has been measured by tests long before management systems were thought of), as that it quantifies *teaching*. Whether or not the child has learned the skills, one has the evidence of workbooks filled in and tests



Workbook/cpf

taken. If Johnny still can't read, well, we've done the teaching; he just wasn't able to do the learning. As Pietras argues in favor of the system, "We can show parents a child's capabilities. And we are trying to guarantee a certain amount of instruction to parents." This is stated more critically by a teacher who opposes the system: "The management system is a neat package for public relations. It is something to show parents, the superintendent and the community. It is designed to show that the teachers are teaching, but that doesn't mean that everyone is learning."

Clearly, the basic purpose for such systems is to meet the growing demands for "accountability." School districts, increasingly under fire for the supposed declining quality of graduating students, can use the system as evidence that they've been doing their job and aren't to blame. Rather than either challenging the value of indicators of "product quality" such as SAT scores, or implementing proven but costly means of improving education such as smaller class sizes, the schools opt for a way to demonstrate "objectively" (i.e., with numbers) that the students have been taught. If they're not all literate — well, we learned way back in second grade that "Some people can only learn a little."

Another effect of implementing scientific management, however, is to make teachers less like "professionals" and more like other workers. As one teacher objects, "this system is stopping teachers from thinking. You can't give them a total package deal and expect creativity." Another says, "All I studied and taught and learned in 28 years of experience is not held in great repute. My input as a professional is not thought of as important. It all has been replaced by the management system." While administrators such as Pietras deny the systems stifle creativity, their attitudes do seem to share something of a manager's outlook: "The exercises could be considered drill-oriented and tedious, but the process is necessary. It serves to make the teachers accountable for their teaching. Scoring tests and recording grades are part of the job. They have to be done, we want them done, and they are in the best interest of both child and teacher."

Scientific management seems to be bringing the same kind of organization of production to the classroom as it does to industry. Quantification, standardization, and, in general, control of the productive process (e.g. learning to read) reduces students to machines being run by Taylorized methods instead of teachers. Students form habits and expectations encountered in the workplace, and Taylorized literacy can eventually help generate profits. Publishing companies can make considerably more money than just selling textbooks by pressuring administrators to buy complete management systems. The capitalists win big while student and teacher lose.

The result for teachers is, to quote the subtitle of Braverman's book, "The degradation of work." The personal, creative aspects of teaching, which originally attracted us to it, are replaced by the grading of post-tests. Our warmth and love of children, our accumulated experiences and talents become less important than the requirements of the management system. We become alienated from our jobs; as with industrial workers before us, we become "proletarianized."

Thus it should be clear that the major objection to scientific management is not that it applies science to education, nor that it doesn't really teach people to read. The point is that the way it uses science to teach reading is destructive to the creative aspects of this work. Students become fillers-in of blanks, and teachers become grading machines.

Is there an alternative? Perhaps an applicable one is presented by the work of Paulo Freire on teaching

adults to read, as described in his books *Pedagogy of the Oppressed*, *Education for Critical Consciousness*, and *Pedagogy in Process: Letters to Guinea-Bissau*. For Freire, learning to read is merely part of a process of "conscientization," of coming to deal critically with one's world in order to change it. Reading is taught not through an authoritarian teacher-student relationship, but through dialogue that leads to a shared description and analysis of one's surroundings. The effect of the process is to overcome rather than to increase alienation.

The challenge is to incorporate science into such experiments in education in a new way — one that serves the needs of teachers and students rather than of managers and publishing companies. By discovering how the development of science has, in this as in so many other fields, been conditioned by the structure of capitalist society, we can perhaps find a way to both a new science and a new education. □

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Meinda Gordon

Sharing Science in the Classroom

An Alternative Teaching Method

by Brenda Lansdown

This article describes a teaching method observed in China in 1977. It is not known whether it reflects current practice, but we feel the teaching method is a valuable model.

In the High School — Facts and Social Relevance

The science lesson I observed in Shanghai in 1977 was on physics — electric circuits. The teacher had a demonstration board on the front desk and a diagram of the circuit on the blackboard. Most of the 54 students seemed eager to answer the questions as to what would happen if . . . Then the teacher performed the operation and the result (the bulb did or did not light) was explained and re-explained by various students. Those who did not understand said so and it was often the other students who supplied the reasoning. All showed patience in having everyone learn and understand.

But I had a question or two to ask myself. Why should students be interested in a basic electric circuit? Why should they want to watch

while the teacher did the experimenting? What kept students wanting to answer questions the teacher raised instead of posing questions themselves and then trying to find answers?

I looked around. Outside the windows in the commune farm there were mosquito traps: long shaped light bulbs which attracted insects and then either electrocuted them or fried them on landing. (I do not know which!) The student whose desk I was sharing let me look at her textbook. There! There on the open page was the connection which began to tie things together for me. The mosquito trap was pictured and alongside it the blackboard diagram.

So — the science lesson was both useful and meaningful to the lives of the students; they were making connections between theory and the practical needs of the commune. However, what could these young people *do*? Could they fix broken wires or analyze a mosquito trap which didn't work?

Later we visited the commune shops where students spent two months full time each year engaging in actual production. In one shop the students were *producing* electric circuits. In another classroom they

were experimenting with circuits or repairing electric motors. So there I had some answers. Theory, hands-on practice and social needs all intertwined, all meaningful and important to the students' lives. I was told, too, that workers from industry come to the classrooms to tell how what they learned in school has been helpful to them in the factory work, for, after all, it is the workers themselves who design the way production proceeds.

The Method of Thinking

Another question occurred to me. Is the teaching *method* optimum for achieving the larger goals, goals on the forefront of industry where workers have to face new problems, think up creative answers, and test their solutions in the field?

There are really two aspects in every course of study: the content and the method of thinking. The whole of these students' society certainly supplied the rationale for the content offered, but what about the method of thinking which the physics lesson conveyed? Facts came from the teacher, they were introduced and illustrated by his manoeuvres. Students tried to find the right explanations for what they observed. They helped each other understand preconceived concepts.

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Is there anything wrong or limiting with this approach? To answer this, one has to select criteria. While in most countries of the world, the method of thinking conveyed by school teaching is not analyzed (indeed it is not often discussed although it exists forcefully), in the People's Republic of China the method of thinking is paramount. It is known as *Mao Zedong (Mao Tse-tung) Thought*, Mao's adaptation of Marxist-Leninist thinking to the history and needs of the Chinese revolution.

There are many facets to Mao Zedong Thought. Some of these are: unity of theory and practice, relevance to the needs of workers and peasants, the belief that everyone can learn and be helped to understand. So far, no problem with the physics lesson. Let's look at another lesson I observed, one on politics.

In the Junior High School

A junior high school class was presented with a quotation from the works of Mao. On the board the teacher wrote: "Why is it important to distinguish friends from enemies?" The teacher explained the assignment briefly. Then the students from each double desk made groups of four by turning around or joining the couple in back or in front of them. The students had evidently read what Mao Zedong had to say on the subject. Now each one shared with his or her companions examples of what the quotation meant in their own lives, where they had experienced the acts of friends or enemies. The discussions were lively with everyone contributing. Toward the end of the lesson one member from each group reported (very fluently) to the rest of the class a summary of the ideas which had been generated; it was a synthesis of the group's process. The teacher then asked whether the others agreed or not.

The Lessons Compared

In what ways is this lesson on politics similar to and different from the one on physics?

The content of both lessons was rooted in the students' experiences, the method of both lessons provided for student-student interchange, but the method of thinking conveyed by each lesson was different.

The facts of the physics lessons came from the teacher as did the questions. The students learned and explained according to a pre-conceived correct pattern. The facts of the politics lesson came from the students' own experiences as did the questions they asked each other. There was a pooling of knowledge from reading and shared experiences. The physics lesson aimed at having each student understand certain facts and relationships, the politics lesson aimed at having the students discover facts and relationships and then create a new whole by summarizing the collective experiences. In both lessons the teacher had

chosen the area and concepts within which the lesson was focused. In the physics lesson these were the dynamics of electricity, in the politics lesson they were the dynamics of a socialist society, but within the provided focus, the methods of thinking differed. In the physics lesson the facts and relationships were given from authority; the role of the learners was to be able to repeat and explain correctly. In the politics lesson the learners learned from each other, putting their experiences into their own words, fitting these to the shared experiences. There were no right answers from authority but a correctness of interpretation agreed upon by the group, a whole cluster of possible answers.

I pointed out the differences to a friendly science teacher who acted as my guide and interpreter. She agreed that the methods of the politics lesson were better but she explained that the country had not yet had time to work on an overall change of teachers' habits and long used methods.



Richard A. Bertocci

In this class, which took place in a summer playground in Boston, there was no problem in solving the contradiction between play and study. Every child left his or her play to work with the science materials as soon as we arrived.

Importance of the Method of Thinking

This problem assumes major importance at present in the current drive to increase interest and skill in science all over the country. So far as I know, until recently there was little science taught in the elementary school. Let us see how the method of teaching which conveyed the thinking of the politics class would work out in a science lesson. The principle can apply to any level of teaching, but we will illustrate from an elementary school level

where a similar lesson on circuits is well within the grasp of children aged nine or ten. It is the principle of the method which makes the transfer possible.

Investigation and Colloquium

In science we call this type of lesson "Investigation-Colloquium." Investigation is provided by first-hand contact with materials which by their potential interactions are related to important science concepts. The colloquium is a verbal sharing of perceptual experiences, a

collective discussion about contradictions all expressed by the learners; the group searches for possible solutions, not previously decided. This all leads to collective future action. The teacher's role is one of helping to pinpoint the contradictions as expressed by the learners and giving everyone a chance to contribute, to think together. The teacher does not give answers, but helps with vocabulary, asks questions which have many possible answers (not just a "right" one) and so encourages creative thinking.

Principles and Applications of the Investigation and Colloquium Method

Each principle is followed by an application to a science lesson in elementary school.

1. The teachers or workers committee has to decide which science concept is to be the focus of study, and in what ways this is relevant to the social context of the students.

1. A lesson on circuits would be chosen because it introduces part of the electromagnetic phenomena of the universe, an aspect of the basic concepts of mass, energy as well as of life. It would be assumed that the children had some experience with electric lights and perhaps electric generators in their commune.

2. A common experience has to be provided so that the students can think together. The experience is provided through free experimentation with materials whose interactions present the concept to the senses in a variety of ways.

2. The common experience is the crux of the lesson to generate the kind of thinking we are talking about. It really requires that each child has access to carefully selected materials with which to experiment freely. In this case a group of two, three or four children would sit around a table on which were dry cells, copper wires, some flashlight bulbs and some kind of sticky tape with which to hold things together. The only instructions needed are: "See if you can make the light light". That is really all. It invariably works. Children are highly motivated and very ingenious.

3. The group then is able to share each person's perceptions of the experience. This sharing usually reveals problems and contradictions, either in the perceptions or in the experiences themselves.

3. After each group has achieved success the teacher arranges for a verbal sharing period. This is where we learn that the children have discovered many, many different phenomena. Some will say that the wires got hot, others will say they didn't. A contradiction! Further sharing of facts shows that when electric energy (the teacher supplies this phrase) is doing work like lighting the bulb, the copper wires do not get hot. When there is a "short circuit" and no work done, the copper wires do get hot, by turning the electric energy into heat energy. Many other problems are revealed. The wires have to be connected firmly. Isn't there a better way to hold them than with sticky tape? Two dry cells make the light brighter, two lights on one dry cell have a dimmer light. And so on and so on. Problems and contradictions galore, many solved by more careful observation or more sharing of each other's experiences.

4. The nature of the problems and/or contradictions has to be reduced to objective statements upon which everyone can agree.

4. The learnings can be agreed upon and stated clearly. The residual problems need to be stated also by collective agreement.

5. Solutions to the problems are sought by reading, by asking other sources, or by further concrete investigation.

6. The group pools various ideas of their own which may be original or adaptations of the resources.

7. An explanation or plan of action is agreed upon.

5,6,7. Older children can read or ask adults about the remaining problems, then return to another lesson. But this can also be a lesson for which the teacher brings in additional materials to provide more experiences.

Investigation-colloquium as a way of teaching science closely parallels the politics lesson: a basic common experience, a sharing of ideas and relevant perceptions interpretations, and a summary of the collective creative thoughts.

Investigation-colloquium teaching brings into the classroom a procedure by which Mao Zedong Thought can be applied to substantial academic subject matter. It parallels not only the procedures used by many forefront scientists but also the study procedures by which members of communes and factories do their after-work study and solve problems of their work life. In these sessions everyone states the problem as he/she sees it. These statements are then refined until only the objective facts are left and these again are related in a statement which voices the problem and the contradictions.

For adults and older children there can be a search into the literature and from experts to learn where similar problems have been addressed. The younger children follow their sessions with reading and then with further investigation on additional materials supplied by the teacher. For example the circuit



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lesson might be followed by one in which additional materials would lead to discovery of what type of wires allow electrical energy to flow through and what type of materials heat up.

To complete the training in Mao Zedong Thought a few more aspects have to be incorporated: that of history based on class struggle and emphasis on dialectic change. Of course experience in a related industrial set-up and repairing simple appliances is optimum. All this is more readily achieved in a socialist society than in one not yet arrived at in a nonexploitive system. All aspects of investigation-colloquium science teaching with its trend toward Mao Zedong Thought are as applicable to the biologic as to the physical sciences, and indeed to all other areas of the school curriculum.

The Vital Importance of Addressing the Method of Thinking

Thinking that emphasizes learning from authority is a teaching method from feudalistic tradition. Thinking that emphasizes the role of the individual is a prime example of the capitalistic mode of teaching. Any society inherits the left-over traits or characteristic thinking methods of the previous social

order. Mao Zedong was eternally aware of this. In the Soviet Union where new content after the revolution was taught by authoritarian methods people had difficulty changing. Societies that can prepare children for leadership in social orders where the world's goods are more evenly distributed, and where collective living is the foundation, should have the foresight to teach methods of thinking and problem solving in anticipation of this new social order. Indeed, they have an obligation to do so.

In the people's Republic of China where thinking is a primary concern and where science is now on the ascendant in the curriculum, a concern for new methods of teaching science might well be embraced. □

NOTE

Many examples of sets of materials which motivate the type of thinking being discussed as well as verbatim accounts of "colloquia" by children of all ages and social backgrounds are given in the book: *Teaching Elementary Science Through Investigation and Colloquium* by Brenda Lansdown, Paul Blackwood and Paul Brandwein, N.Y. Harcourt Brace Jovanovich (1971)

In several areas where there is concern to develop in children a type of thinking which will equip them to solve some of the problems of the future. Investigation-Colloquium science teaching has been adopted in several cities in the USA, Canada and Ghana.



Youth Alternatives/cpf

Jonathan Kozol's Tactics for Teachers

How to Challenge the School System

Jonathan Kozol is a familiar name within the circles of alternative education. As teacher and author*, Kozol has experienced many facets of the public school system and has had a great deal of personal contact with administrators, teachers, parents and students. Recently he has completed a manuscript entitled "Fighting Back", in which he speaks to the frustrations and feelings of ineffectiveness of many educators and concerned individuals. Kozol offers in his text an entire strategy for change ranging from subversive activities within the classroom to small victories within one's community. Not surprisingly, Kozol's faithful publishers, Houghton-Mifflin and Bantam Books, refuse to publish and distribute his handbook.

Kozol is well aware of the problems in American society and its public school system. Solutions require skill in developing political awareness, time-consuming work, patience, and a specific plan based upon small gradual steps. One other requirement in the mechanism towards social change, and the most important, is people, a great number of people with common concerns seeking a common goal. This too is something Kozol has become acquainted with in his years of traveling and meeting people:

It would be deceptive to attempt to build a sense of common cause where none exists. Wherever it *does* exist, however — but where people who have most to gain through recognition of that common cause don't know that it exists — then it seems that we are in an ideal "breakthrough situation."

Organization of these people is also a key factor in working toward social change:

Clearly, then, with something more than accidental preparation parents, kids and teachers can develop sweeping and long-lasting power to transform their schools.

Following is a summary of 20 tactics that Kozol includes in his manuscript. These can be used in the classroom setting and many can be adapted for science classes.

1. Expose the purpose of the schools by quoting a) famous educators such as Horace Mann. For example: . . . in regards to those who possess the largest shares . . . of worldly goods, could there, in your opinion, be any police so vigilant and effective, for protection of all the rights of person, property and character, as such a . . . system of common schools could be made to impart . . . Would not the payment of a sufficient tax to make such training universal, be the cheapest means of self-protection and insurance?

b) certain Boards of Education such as Arizona: "It is not the job of the schools to create a new social order . . ." The job is to "augment a child's love of country, ideals of the home . . ."

c) school regulations for curriculum content to point out that "schools exist to serve the flag they fly".

2. Speak out in the first person; let students realize that teachers have feelings and emotions. Include in this process discussion of personal experiences that differ from curriculum textbooks.

3. Expose the myth of history and the story of "progress". Teach an alternative history — that of the ordinary man and woman — generally a buried viewpoint. Example: Thoreau.(1)

4. Make students realize it is okay to say no. Teach them to question the contents and habits of classes, schools, and societies that demand unquestioned obedience. A teacher's own political involvement can set the best example.

5. Break the myth of the infallible authority figure. Show that someone like a teacher can be wrong by inviting another teacher(s) with whom you disagree into the classroom and debate an issue in front of the class.

6. Introduce alternative materials, including radical books (SftP materials), films, music, etc.

7. Quote extreme views of the radical patriots and radical scientists that you learn about from the alternative materials.

8. Include more women's history: e.g., Emma Goldman, Helen Keller, Dorothy Day. (See the article

by Margaret Alic in this issue of SftP for more information).

9. Open school records to students, let them see what's been said about them.

10. Expose the carefully planned learning and "discovering" that students undergo by giving them the Teacher's Guide to various curricula.

11. Write a textbook with the students. Demonstrate that we are part of history and anyone can create it. Examine textbook formats and viewpoints.

12. Involve students in real struggles within the community and in the investigation of the underlying politics. For example, help at a daycare center, recycle discarded bottles, or work with a tenants' council.

13. Confront painful contradictions: face up to and deal with those of us who are well off and those of us who aren't, those who exploit and those who are exploited.

14. Resist the Pledge of Allegiance. Compare what it says with what really exists. Document your resistance, write a new pledge.

15. Teach about repression and U.S. imperialism in what textbooks call the "Free World", Latin America, etc.(2)

16. Become involved with struggles within your community. Seek small but visible victories. Picket a

racist organization or a company that is polluting the environment; organize a mass mailing to a government representative concerning a local issue.

17. Build coalitions with parents, students and teachers: share school records, honesty and friendship; unionize; form teacher centers.

18. Teach hardcore basic skills.

19. Take issues to court, such as refusing to say the Pledge of Allegiance. Use the press and TV.

20. Don't fear taking initiative and following through.□

REFERENCES

1. *An Underhanded History of the USA*, by Nick Thorkelson and Jim O'Brien, available from New England Free Press, 60 Union Sq., Somerville MA 02143. \$2.00. *The History Book*, Pål Rydberg and Gittan Jonsson et al, 1974. Available from Midnight Special, 1335½ West Washington Blvd., Venice, CA 90291. \$5.95.

2. *The Washington Connection and Third World Fascism: (The Political Economy of Human Rights, Vol. I)*, by Noam Chomsky and Edward S. Herman. South End Press, Box 68, Astor Station, Boston, MA 02123. \$5.50.

*Kozol has written three books that we've found especially valuable: *Death at an Early Age* (Bantam Books, NY 1968), *The Night is Dark and I Am Far From Home* (Houghton-Mifflin, Boston, 1975), and *Children of the Revolution* (Delacorte Press, NY, 1978).

Discovering the History of Women in Science

A Course Outline

by Margaret Alic

Recently the scientific establishment and the federal government have professed an interest in encouraging women to enter the scientific professions. Their efforts have usually taken the form of "Career Facilitation Projects" and "Science Career Workshops" for undergraduate women, funded by the National Science Foundation. In addition, various scientific societies have held conferences or established committees on women. These projects have successfully avoided the underlying problem within the educational system: From elementary school on through university we are taught that science is, and always has been, the province

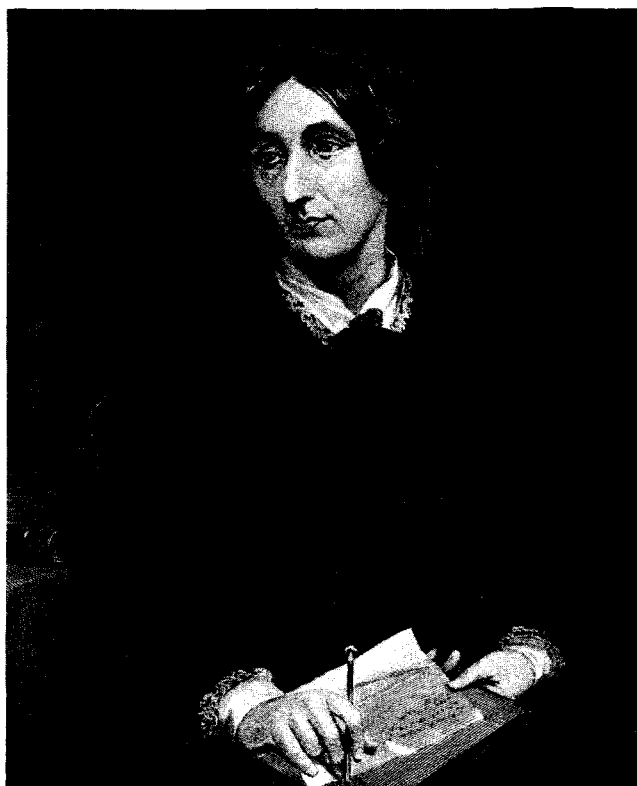
Margaret Alic is a member of the Portland Chapter of Science for the People and is working on a book on the history of women in science.

of men. We learn about Pythagoras and Archimedes, but not about Hypatia or Hildegard: about Copernicus, Galileo and Newton, but not about Emilie du Chatelet, Maria Agnesi or Mary Somerville(1). We hear about Watson and Crick, but not about Rosalind Franklin who unwittingly provided the data that allowed them to determine the structure of DNA(2).

To counter this neglect of women scientists in conventional curricula, courses have appeared at colleges and universities across the country(3). Some of these classes focus on the problems and roles of women scientists today. Others, like our course at Portland State University, are concerned with the history of women in science and math. When we first conceived of this course in 1976 our knowledge consisted of what we had learned in school and as science workers. Therefore, when we

brainstormed women scientists, we came up with Marie Curie, Rachel Carson, a couple of professors we'd had in college, and Rosalind Franklin (having recently read Anne Sayre's biography, an answer to the sexist and self-serving portrayal of Franklin in *The Double Helix*(4)). After three years of research and teaching we now know of literally hundreds of women who have either made important scientific contributions, or whose lives and work illustrate the obstacles that have confronted women scientists throughout written history.

The premise of our course is that women have always done scientific work. However, the nature and extent of their contributions, and any recognition they may have received, is determined, at least in part, by the



Culver Pictures/Math Equals
Mary Fairfax Somerville, famous 19th century Scottish mathematician.

position of women and the structure of scientific endeavor in the society and historical period in question. The majority of our students have been women with little background in science. Often they exhibit symptoms of "math and science anxiety" as a result of previous educational experiences. With these factors in mind, we have had four main goals for our class: 1) to study the lives and work of individual women scientists within their historic context; 2) to identify individual factors (eg. wealth or social status) and historical patterns (eg. increased educational opportunities or the appearance of a "star" such as Marie Curie) which promote the participation of women in specific fields of

science; 3) to teach such elementary scientific principles as are needed to understand the work of the women under discussion; 4) to encourage discussion of current issues in science and technology that affect us all.

Our course begins with a discussion of *The Double Helix* and *Rosalind Franklin & DNA*, illustrating "how science works" in capitalist society and the position of women within the scientific establishment. This leads naturally into the history of genetics and molecular biology as traced through the work of women scientists, with discussion of recombinant DNA research and the "biological revolution."

We then consider the work of women scientists from ancient times through the Renaissance, and the women mathematicians and astronomers of the 18th and 19th centuries. The significant role of women as writers and popularizers of science is also discussed. We trace the growth of an American "community" of women scientists within the women's colleges and the Harvard College Observatory in the late 19th and early 20th centuries. Marie Curie's role as the ultimate "token woman" is critically examined, along with a general history of nuclear physics through the work of women.

Finally we study the growth of those sciences, such as natural history, botany and nutrition, which historically have been considered "female sciences". Included also are laboratory exercises, and panel discussions with women scientists and with "non-professional" women doing scientific work. We conclude with a look at sociology and how science has historically been used as a weapon against women.

Interest in the history of women in science is growing rapidly and new books and articles are appearing regularly. Perhaps we are moving closer to the day when women will be considered an integral part of both the history and the current work of science.□

REFERENCES

1. *Math Equals: Biographies of Women Mathematicians and Related Activities* by Teri Perl (Addison-Wesley, Menlo Park, 1978) is an excellent elementary text containing information on these women, and mathematical exercises suitable for varied backgrounds.
2. Sayre, Anne, *Rosalind Franklin & DNA*, New York: Norton, 1975.
3. A summary of women-in-science courses is available from Phyllis Chinn, Department of Mathematics, Humboldt State University, Arcata, CA 95521. Also, a 1975 "Women & Science" class at the University of Washington developed a pamphlet, *Hypatia's Sisters: Biographies of Women Scientists Past and Present*. It is distributed by Feminists Northwest, 5038 Nicklas Pl. N.E., Seattle, WA 98105.
4. Watson, James D., *The Double Helix*, New York: Atheneum, 1968.

For more information and resources on women in science write to or call:

Science for the People
897 Main St.
Cambridge, MA 02139
617-547-0370

A New Wave of Reaction in Europe

Sociobiology Used to Justify Racism, Sexism and Elitism

The pioneers of this school, which has sometimes been described as 'anthroposociology', have of course been scorned as antiquated 19th century 'racists' whose backward ideas paved the way for Adolf Hitler. Today, however, the wheel has turned full circle to vindicate the 'anthroposociologists'. The theory that behavior and social organisation are determined to a crucial extent by genetic inheritance is now central to that most progressive branch of the biological sciences called 'sociobiology'.

The study of this subject is now being pursued by 'sociobiologists', led by Harvard zoologist Edward O. Wilson. Their belief that behavioural patterns are governed by our genes and shaped by evolution stems from a new appraisal of studies by ethologists of the tightly organised societies of bees and ants, mating rituals, social hierarchies among monkeys and dozens of other examples of animal behaviour. Their findings are that there is a biological basis to all social structures and that the origin of behaviour is to be explained in terms of how it improves an individual's or society's fitness to survive. Already it is recognised that sociology and psychology will have to modify a great deal of their theories under the impact of sociobiology, which is teaching us that aggressive and co-operative behaviour alike are as much a product of our genes as the colour of eyes or the size of the brain.

—Richard Verral, *Spearhead* (publication of the National Front in Britain), March 1979.

Allen *et al.* characterize *Sociobiology: The New Synthesis* as the latest attempt to reinvigorate theories which in the past "provided an important basis for the enactment of sterilization laws and restrictive immigration laws by the United States between 1910 and 1930 and also for the eugenics policies which led to the establishment of gas chambers in Nazi Germany... I resent this ugly, irresponsible, and totally false accusation."

—E.O. Wilson, *New York Review of Books*, Dec. 11, 1975

Repeating some of the club's ideas, Mr. Pauwles, editor of *Figaro* magazine, wrote recently that "the life sciences reveal the necessity of a hierarchy of individuals in all advanced animal societies as in human societies."

—Jonathan Kandell, *New York Times*, July 8, 1979

Appelant, pele-mele, a leur rescousse les auteurs les plus divers — Debray-Ritzen, Damezil, Nature"), Fabre-Luce, Crozier, Touraine, Bernard-Henri Levy ou Maurice Clavel — et pechant sans vergogne ce qui leur convient dans leurs ecrits, ces nouveaux croises de l'Occident laic y publient chaque semaine des textes ideologiques aux limites du racisme, ...

—Kathleen Evin, *Le Nouvel Observateur*, July 2, 1979

New Right partisans hold that individuals and races are divided by insurmountable barriers of hereditary inequality; in support of this view, they cite the much debated research by such American scientists as Arthur Jensen, William Shockley and Edward O. Wilson. France's New Righters thus call for a "meritocratic" society in which the ablest and most intelligent would rule.

—*Time* magazine, Aug. 13, 1979

The Sociobiology Study Group of Boston Science for the People strongly recommends that people read: ***Psychology, Racism, and Fascism*** by Michael Billig (A Searchlight Booklet).

In 1975, upon publication of E.O. Wilson's *Sociobiology: The New Synthesis*, we warned that sociobiology would soon be used to bolster reactionary politics. Wilson called this "irresponsible and totally false." We were correct.

In March 1979, the powerful and violent neo-Nazi party in Britain called the "National Front" published an article which openly used sociobiology as a justification for their racist policies (*Spearhead*, March 1979).

Recently, the intellectuals of the French "New Right" have sought, in this modern version of biological determinism, justification for their avowed policy of rule by the "intellectual elite" (see, e.g., *Figaro* magazine, July 1979). This new attack on egalitarian principles has received extensive publicity (*New York Times*, July 9, 1979; *Le Nouvel Observateur*, July 2, 1979; *Time* magazine, August 13, 1979).

During our study of this wave of reaction under the guise of science, Michael Billig's pamphlet *Racism, Fascism and Psychology* came to our attention. We found his historical analysis of the relation between European academics and Neo-Fascist movements impressive, thorough and helpful. Billig also analyzes the contemporary neofascist movements and their intellectual supporters. His pamphlet is a source of powerful, documented arguments that demonstrate the "neutrality of science" as the myth that it is.

We urge you to read it. The Sociobiology Study Group of the Boston Chapter

(A limited number of copies will soon be available from the Cambridge SftP office. Otherwise, send 50 pence U. K. or equivalent to: A.F. and R. Publications, 21, Great Western Building, 6, Livery Street, Birmingham, U. K.)

Teaching Science for Humane Survival

Basic Skills and More

by George Salzman

Science for Humane Survival is in its eighth consecutive year at the University of Massachusetts' Boston Campus. Controversial from the start, it continues to trigger allergic reactions from various sensitized faculty members whenever it comes up for consideration at one or another college governance meetings concerned with curriculum, most recently last spring when its suitability to be included among the core courses of the College of Arts and Sciences was, predictably, challenged. As happened on each earlier occasion, the course — and the students, who have consistently been its strongest supporters — won out, and so it continues to fulfill “the science requirement” and officially to be a *bona fide* introductory science course, though suspect (or worse) in the eyes of various more conservative faculty members.

It was spawned, as was Science for the People itself, by the tumultuous climate of the late 60's and early 70's, and by a growing realization that science in the real world was not a neutral, objective, value-free study of nature. I knew that some of the most elite physicists in the U.S. were directly involved in conceiving and rough-designing the automated battlefield for use in Vietnam, and the course grew out of my desire to try to shape my own life so that, as a science teacher, I would have a positive social effect instead of just serving the system, which I saw through increasingly radicalized eyes.

Science for the People played a large part in changing my perceptions from those of a normal theoretical physicist with the customary professional ambitions; it helped transform me into a rebel physicist, and I tried to mold the course — initially called Science for Survival — to incorporate and help teach the value judgments which I saw as of at least as great importance as the body of traditional scientific knowledge.

The course had hardly begun its second year when the Popular Unity Government of Chile was smashed by the brutal violence of the U.S.-supported military junta. I realized then that “Science for Survival” could be interpreted to mean “mere” ecological survival of the

species, and I wanted it unambiguously to embrace the notion of survival under humane conditions, hence the change of name.

The catalogue description sums it up as follows: Science for Humane Survival (is) an interdisciplinary year-long course that attempts to answer two main questions: How can long-term survival of the human species in humane conditions be achieved? How can individuals survive as healthy and vigorous humane beings in contemporary industrialized capitalist society? Topics include food, energy, pollution, population, ideology, social organization, transportation, exercise, clothing, shelter, competition. Open to all students, the course has no prerequisites, is organized topically, and may be entered in the Fall or the Spring and taken for either or both semesters. Three lecture hours and one film or guest lecture presentation weekly. Several field trips each semester. Offered on a pass/fail basis only (no letter grades), it carries 4 credits per semester and counts as a year of introductory science.

In the fall of 1976 the Science Teaching Group of the Boston SftP Chapter agreed that it would be appropriate to call the course “a Science for the People course,” and beginning then that is how I subtitled the headings for all materials prepared as handouts for the course. In fact it really has been a Science for the People course, as reflected by the viewpoints that it develops and because most of the faculty teaching it have been members of SftP. Over the years ten faculty were involved teaching it, seven of whom are in SftP. And one of them also taught the course one year at Norfolk and Walpole State Prisons, near Boston. Another, on the faculty of the Univ. of Mass. at Amherst, has offered the course for a number of years in the Univ. Without Walls program.

During the first twelve semesters that it was offered at the Boston Campus, over 3,000 students registered for Science for Humane Survival. My guess is that between 2,000 and 2,500 different students have taken either one or both semesters. Then last year I was on leave, and Joseph Alper of the Chemistry faculty and Sociobiology Study Group (of Boston SftP) who had co-taught the course with me for many years, continued

George Salzman is a theoretical physicist who believes that science and scientists ought to learn that life is even more important than science.

to offer it, and is doing so again this year. Now I'm trying to develop a "physics for humane survival course" in the physics curriculum proper. Same general motivation, but more narrowly restricted subject matter.

If you would like more information from any of those of us in SftP who have taken part in this course, you can write to: Science for the People, 897 Main St., Cambridge, MA 02139.

LECTURE SERIES FALL SEMESTER

Part I.

Introduction to Science as The Perception of Reality

Domain, content, and practice of science. Science conceived as the study of conditions that affect life. 2 lectures

1. Science and non-science, conceptualization, reality vs. myths, education vs. indoctrination.
2. Objectivity and ideology in science, the nature of the problem.

Part II.

Global Considerations

Unit A. Environment and the science for understanding it. Air, Water, and radioactive pollution. Environmental impacts of population, affluence, technology, capitalist production. Perspectives of Commoner, Bookchin, Ehrlich. Scientific methodology. 6 lectures.

3. The ecosphere, introduction to global considerations and ecological concerns.
4. Basic ideas of chemistry, and their application to air pollution.
5. Threats to the stratospheric ozone layer, introduction to a current controversy.
6. Water pollution.
7. & 8. Population, affluence, technology, capitalism, their environmental impacts, and limits to growth.

Unit B. Energy, from geophysical and geobiological perspectives. Sources, utilization, conservation, social factors. 5 lectures.

10. Energy, transformations from one form to another, resources, scales of energy.
11. Nuclear power, basic principles and problems. Water-cooled reactors, breeder reactors.
12. Alternative energy sources, solar, wind, agricultural/biological.
13. Socio-political aspects of energy use in contemporary industrialized capitalism.
14. New 'Alchemy.' New agriculture/aquaculture low energy intensive technology, an ethic of land care.

Part III.

Food and Nutrition

Unit A. Energy in the biosphere, genetic diversity in food crops, the so-called Green Revolution, and the danger of possible ecocide. 3 lectures.

15. Biological energy flows, energy use in food production, agricultural technology.
16. The Green Revolution and its ecological and social implications.

17. Gene conservation, the necessity for maintaining genetic diversity.

Unit B. Nutrition, hunger, food chemistry, biology of digestion, nitrogen fixation. 8 lectures.

19. Food types, organic chemistry, glucose, photosynthesis, dynamic equilibrium.
20. Respiratory quotient, proteins, nitrogen, amino acids, sour-dough whole grain rye bread baking.
21. Basic principles of human nutrition, food processing, and toxicity.
22. Food additives, fabricated and synthetic foods.
23. Contamination in the whole food "chain," environmental/biological and in processing.
24. The physiology of human digestion.
25. Food molecules and their basic chemistry.
26. Risk vs. benefit analyses, their limitations, and the use and misuse of science.

FALL SEMESTER TEXTBOOKS

Our Synthetic Environment, by Murray Bookchin, 1974 edition, Colophon Books (Harper), New York, paperback, lxxvii plus 305 pp., \$3.95.

The Closing Circle: Nature, Man and Technology, by Barry Commoner, 1971, Bantam Books, New York, paperback, 344 pp., \$2.25.

Let's Eat Right to Keep Fit, by Adelle Davis, 1970 edition, Signet Books (New American Library), New York, paperback, 334 pp., \$2.25.

Diet for a Small Planet, by Frances Moore Lappe, 1975 edition, Ballantine Books (Random House), New York, paperback, 411 pp., \$1.95.

Manifesto of the Communist Party, by Karl Marx and Frederick Engels (Samuel Moore's 1888 translation from the original German text of 1848, edited by Engels), 1975, Foreign Language Press, Peking, paperback, 83 pp., \$0.35.

LECTURE SERIES SPRING SEMESTER

Part IV

Science, Mysticism, and Humane Survival

Comprehending the world. Knowledge, belief, mysticism, wisdom, culture, understanding, expectations. 2 lectures.

1. The universality of partial ignorance, experience and conceptualization, expectations of the university.
2. Anti-science, mysticism, astrology, relationships to nature.

Part V

Health Care

Unit A. Elements in individual health. How we relate to ourselves (our body/mind), and the Malatesta imperative for the program of anarchism: "bread, freedom, love, and science — for everybody." 5 lectures.

3. Food and science, bread and yeast, sprouts, yogurt, porridge, granola, peanut/seed butter, muesli.
4. Feet for transportation, the human potential, and the poetry of the high mountains.
5. Mental well-being, testing, grading, pressures of a competitive society.

6. Centenarian-rich communities and factors apparently important for health, vigor, longevity.

7. My transformation from conservative to radical, and my vision of the future humane society.

Unit B. Institutional factors in health. Societal goals. The commodification of practically everything essential for health. The role of ideology. 4 lectures.

8. Contemporary problems in American health care.

10. Community health care for people, not profit. Film, *Taking Back Our Bodies*.

11. Violence in sports, the teaching of ideology through physical education.

12. Mental health care in China.

Unit C. Biology, psychology, and ideology of human behavior and of differences in human mental capacities. Social Darwinism, the I.Q. controversy, the "new" sociobiology, eugenics, behavior modification and social control. 10 lectures.

13. Contesting ideologies: Social Darwinism vs. Mutual Aid, class vs. egalitarian societies, social control vs. freedom.

14. The nature of biomedical research and women's needs in a male-dominated society.

15. Psychology and women: myths and mistreatment.

16. The concepts of normality and pathology, and behavior modification.

17. & 19. The XX-XY problem: How research on biological bases of sex roles is used for social control.

20. Genetics, reproduction, diversity in and among populations.

21. Genetic engineering.

22. Race, I.Q., busing, and politics.

23. Sociobiology.

SPRING SEMESTER TEXTBOOKS

Our Bodies, Ourselves, Boston Women's Health Book Collective, 1976, Simon and Schuster, New York, paperback, \$3.95.

Silent Spring, Rachel Carson, 1973, Fawcett Publications, Greenwich, Connecticut, paperback, 304 pp., \$1.25.

The Opium Trail: Heroin and Imperialism, Committee of Concerned Asian Scholars, 2nd Ed., 1972, New England Free Press, 60 Union Square, Somerville, MA. 02143, paperback, 85 pp., \$0.60.

Mirage of Health: Utopias, Progress, and Biological Change, Rene Dubos, 1971, Harper and Row, New York, paperback, viii plus 282 pp., \$1.75.

Away With All Pests: An English Surgeon in People's China: 1954-1969, Dr. Joshua S. Horn, 1969, Monthly Review Press, New York, paperback, 192 pp., \$3.75.

Ishi in Two Worlds: A Biography of the Last Wild Indian in North America, Theodora Kroeber, 1961, University of California Press, Berkeley, California, paperback, 258 pp., \$2.45.

The Making of a Radical: A Political Autobiography, Scott Nearing, 1972, Harper, N.Y. (available only from Social Science Institute, Harborside, Main 04642), paperback xi plus 308 pp., \$2.45.

The Web of Life, John H. Storer, 1972 Ed. with photographic insert, Signet Books, New York, paperback, 128 pp. plus 22 pp of photographs, \$0.95.

The Forest People: A Study of the Pygmies of the Congo, Colin M. Turnbull, 1961, Simon and Schuster, New York, paperback, 298 pp., \$3.95.

Feed, Need, Greed

The Politics of Food in Bite-Size Morsels

by the Boston SftP Food and Nutrition Group

The Food and Nutrition Group of the Boston chapter of Science for the People has revised our alternative curriculum for high school students entitled *Feed, Need, Greed* (first written in 1974). Our goal is to raise the awareness of students and teachers to the "why's" of food production, to the effects of diet on health, and, in general, to deal with issues of nutrition and hunger in a political context. We feel it's necessary to counter the majority of nutrition texts published by the food industry, which advocate incomplete nutritional practices and then blame the consumer for poor

eating habits and health problems. The common myths on nutrition, for example that we make free choices about what we eat, that overpopulation and hunger result from ignorance, and that multinational corporations such as Nestle truly serve the nutritional needs of developing countries, must be examined. To dispel these myths, a political analysis of food and population issues is mandatory.

Following is an activity we encourage teachers to use.

Junk Food Derby

Below are listed twelve foods. Rank the foods from the one you think is most advertised at the top, to the one you think is least advertised at the bottom. Discuss your guesses and how they compare with the actual answers.

1. carbonated soft drinks
2. desserts
3. citrus fruits
4. candy and gum
5. macaroni and spaghetti
6. cookies and crackers
7. vegetables
8. non-carbonated soft drinks
9. cheese
10. meats and poultry
11. shortening and oils
12. cereals

Is the order of foods advertised from most to least often similar to your own food preferences (yes/no)?

Today, the average diet contains an excess of both sugar and fat, two nutrients in the greatest quantity of those foods most often advertised. Sugar and fat also contribute to modern health problems such as dental caries (cavities), obesity and heart disease. If your food preferences are similar to the majority of American adolescents, you eat over 100 pounds of sugar a year and 30% more fat than a teenager ate in 1910.(1) Both these

1. *The Changing American Diet*, L. Brewster and M. Jacobson, Center for Science in the Public Interest (1775 S Street, NW, Washington, DC 20009), 1978.

nutrients are important parts of a healthy diet but in much less quantity. What else besides advertising do you think influences people's preferences for less than healthy diets?

Below, list four other influences that affect your food choices besides TV advertising:

Rank them in the order that they influence your food choices. Discuss your order with the group and together decide on the most influential forces on your diet.

Going Further Activities

Some or all of the following can be done:

1. Decide on the order of the foods advertised in the activity in terms of the most to least healthy.
2. Write alternative ads. Decide what appeals to the consumer and what qualities of the food product you want to sell. Try them out on the group.
3. Write ads that really reflect what's being sold. Sugary cereals do not make you stronger or better liked by your friends; tell it like it is.

Table of Contents for Feed, Need, Greed

Unit I Population and Resources

Section 1: *Exploding the population myth—Malthus*

Section 2: *Why do people have children?*

Section 3: *Resource limitations*

Unit II The Lean and the Lumpy

Section 1: *Physical dimensions of hunger*

Section 2: *Changing eating patterns*

Section 3: *Health risks of the American diet — salt, sugar, and fat*

Section 4: *Politics of food processing and chemical additives*

Unit III Nutritional-Industrial Complex

Section 1: *Tastes like love*

Section 2: *Survival of the fattest*

Section 3: *Exploited labor and our food*

Section 4: *Bottle or breast?*

Unit IV What Do We Do With What We Know?

Section 1: *Introduction to change*

Section 2: *Personal changes*

Section 3: *Local and community actions*

Section 4: *National change*

Section 5: *Global visions*

Answers

Most advertised

1. cereals
2. candy and gum
3. shortening & oils
4. cookies and crackers
5. desserts
6. non-carbonated soft drinks
7. carbonated soft drinks
8. meats and poultry
9. macaroni and spaghetti
10. vegetables
11. citrus fruits
12. cheese

Least advertised

(Taken from *Edible TV, Your Child and Food Commercials*, Sept. 1977, Select Committee on Nutrition and Human Needs, p.63.)

Tale of a Substitute Teacher

Teaching or Social Control?

by Nancy Gigowski Brown

Between December, 1978 and June, 1979, I worked in ten different Boston inner city schools as a substitute teacher. In some of the schools I spent enough time to get more than a general idea of what was taking place. In most cases I was randomly assigned to classes and subjects that I was certainly not qualified to teach. Generally, when I arrived at the school I was asked to sign my name and was given a room number and the name of the teacher and subject to which I was assigned. My experiences were certainly varied and very interesting. I decided to keep a journal to record each day what I saw, what happened, what students and teachers told me, and the many questions I found myself asking. The following is an entry from one such day.

Every day there is so much to write about. Today half of my day was spent struggling with students who strolled into class late, refused to work, refused to leave the class, and who yelled out more bad language than I had heard in a year. They called me stupid and said "fuck you" as I asked them to leave. As they explained, I was stupid because I was teaching a craft I had just learned the day before and I was slow at showing the students what to do. I had to ask for help from another woman teacher across the hall. I felt caught up in the system that produces these kinds of situations. Of course the students had a right to demand that the teacher know what she was doing if they

were going to learn anything. But there was no one else to take this class, so they misplaced me in an art class teaching a subject I knew nothing about.

The problems continued and I finally got angry. The students were somewhat shocked at my outburst. I felt tears. Holding them back trying to maintain some sense of order, I wanted to shout how unfair this whole situation was to all of us. I wanted to tell them how I felt about what a farce schools were and that they were right: schools were places where students were kept, where they lined up, where they spoke when spoken to, where, if they made misguided attempts at grownup behavior, challenging the authority, they would immediately be dealt with in terms of problems and punishment.

Some of the students laughed at my anger. I asked two students, a boy and a girl, why they were doing what they were doing. Why did they need to kick the chairs around, throw books on the floor, swear at the teacher, disrupt the rest of the class to a point where it was total chaos? It seemed like a simple enough question. Their answer was clear and strong. They hated school: they hated teachers! I was a teacher. They hated me. I was stupid, didn't know what I was doing there. And besides, what difference did it make anyway? They didn't learn anything there. School was boring. They couldn't do what they wanted to, and they would quit as soon as they could — two more years, maybe sooner. I felt every word they said. A simple but tragic loss of interest and any commitment to learning.



Nancy Gigowski Brown is a nutritionist now working as a nutritional educator and coordinator in the Wakefield Schools.

I talked with the guidance counselor that afternoon. I found out most of the students I had continual trouble with came from "difficult family situations," a nice way to describe their problems. They were low academic achievers, were absent more than they were in school, had no parental communication, had no hope.

But as I inquired further, I found such a description was common for many of the students in the school. Over half of the children in the city's public schools come from low-income families, perform poorly in academics, and live in environments that perpetuate their social, academic, and economic problems. The counselor said the problems were immense, too immense for the schools to know just what to do.

I asked how often teachers talked about these problems and of their long-range effects on each other, on their families, on the schools, on the community. He smiled, saying I had not been there long enough. Most of the teachers find a way to do what they have to do; but many do give up and just put their time in. The way things have come about, the systems of learning are now too powerful to change. I disagreed. I felt we could bring about whatever changes needed to take place. I told him I felt the parents and kids could help. They needed to be a part of the decisions. We needed to start over if nothing else worked; and from what I saw this was not working.

I asked another counselor what she thought were some of the students' concerns and problems. She said that most of the students she worked with expressed in different ways a sense of hopelessness, a nothingness for learning and, most of all, for their futures. They knew there were few options open to them in the world of work. The future showed them nothing. It was frightening to them. I kept hearing what she said over and over. I didn't want to come back to school the next day. Or if I did, I wanted everything to be different. □

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