

but I do not ever recall an anonymous award of any size being made at a science fair. I am convinced that the type of recognition suitable for fostering student achievement must be determined locally and awards should be assigned with discretion. I can think of no more logical approach to the question because it has such parochial implications. Local science fair directors know their students best.

The 4-H awards different colored ribbons for different accomplishments. Some are first place ribbons, other second place. Some are for the grand champion, some for reserve grand champion placement. Every entrant receives an award—a ribbon. No one goes home feeling her/his efforts were completely in vain, though some realize that they could have done a better job. Likewise, every science fair entrant should be given some acknowledgment of participation. This is the essential minimum.

Who Should Participate?

I cannot leave the subject of science fairs without reference to one more concern. Who should participate? Because sciencing is, in the investigative sense, an activity requiring more than superficial involvement, the science fair experience should be reserved for students who want to do something extra. Students should never be assigned to enter a science fair, unless the assignment is optional with no academic strings attached. I think it is the assigned project that most often appears as a poster, chart, diagram, or model. Such projects, as I have said, only exacerbate the ills of many science fairs.

Limiting the number of entries in fairs through some preliminary screening process may boost their quality. A smaller, higher quality science fair will be a more scientifically and educationally honest activity than the larger fair that is open to all comers. Possibly one of the most grossly unfair occurrences is to give students only a few weeks' notice in which to prepare for the fair. This device may keep participation small, but it also endorses the idea to "hurry and think up something for the science fair." Mediocrity is its direct result; sciencing is also discouraged. Such an approach is not fair.

I do not subscribe to science fairs for only the scientific and academic elite. I do subscribe to high-quality fair administration and participation. High quality need not be synonymous with elitism; it can simply be an acknowledgment that minimal standards, however defined, have been established and used. Participation should be voluntary with no academic reprisals for the student who chooses not to participate. Annual fair dates should be announced one year in advance. If possible, fairs should be held at approximately the same time each year.

In Conclusion . . .

One is obligated to understand what science really is before assuming the responsibility of leading another

through the process of sciencing. All science fair directors and teacher-sponsors accept this obligation when they assume a responsibility related to student participation in a science fair. To assume the responsibility without honoring the obligation is not fair to anyone—especially the student.

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Education

The direction in which education starts a man will determine his future life.

Bodily exercise when compulsory, does no harm to the body; but knowledge which is acquired under compulsion obtains no hold on the mind.

Adolescence Obligations and Educational Policy

Stephen P. Heyneman

DURING THIS CENTURY WE have made great progress in extending human rights to children and young people. Large-scale, exploitative sweatshops are a phenomenon of the past; many state statutes contain provisions against corporal punishment in schools; and the public is now intervening when there is evidence of child abuse or neglect. Many constitutional rights and privileges, previously granted to adults over 18, have been extended to children and adolescents. High school dress codes and freedom of speech restrictions have been relaxed; the right to defense in juvenile court is now mandatory; and employers are required to pay children the national hourly minimum wage for part-time work. These are healthy trends.

Moreover, these legal trends are consistent with social trends and social policy generally. Over the last two decades, educational systems have been modified so that young people can play an increasing role in deciding what they want to learn. As a result of career education and other reform movements, young people are helped to make informed choices on training for their future careers (Heyneman, in press). In fiscal year 1976, eight Federal agencies sponsored 23 research and development projects that included a youth participation component (Heyneman, Mintz, and Mann 1977); these projects were designed to give young people an increasingly active voice in the guidance of their own affairs and over the affairs of others. This, too, is healthy.

Nevertheless, social policy on adolescence can be divided into two categories; the above examples represent only one. They represent a category in which an adolescent's participation is "sponsored"; that is, an adult privilege or an adult activity is extended to adolescents, which they can choose to exercise without having to relinquish their non-adult financial or legal status.

The second category of social policy is one that requires something of adolescents. This differs from the first in that in exchange for health, protection, and education, a non-adult is asked to participate in an activity over which s/he has little or no choice (Heyneman and Thomas, 1977). Thus the first category of policy represents "sponsored" experience; the second category represents "required" experience. I contend that public

policy on adolescence has concentrated on the first and has ignored the second. Briefly I will summarize how each can be defined both for private (family) and public policy, including education, and then suggest how social policy which "requires" something can be advanced without it being unjust.

Sponsored Adolescent Participation

When adolescents are given the right to help make family decisions, the extent of their authority is determined on the basis of their maturity and the issue involved. Outside the family when adolescents are extended the right to help run school disciplinary committees, juvenile courts, school boards, small businesses, runaway centers, drug control programs, or day care centers, their authority within these institutions should be encouraged and welcomed; but in such settings adolescents do not have either ultimate control or responsibility for failure. The extent of adolescent authority is based upon a mixture of personal competence, precedent, and negotiation. However, because nonadults cannot legally own property, make a will, act as business agents or fiduciaries, hold public office, vote, or enter into business partnerships, and especially because they cannot be held responsible for debts, the financial and legal obligations accruing from their participation in institutions ultimately rests with adults. Regardless of how much authority adolescents are given, it is sponsored authority, and the limits of their authority can always be identified (Beaser 1975). Despite

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these restrictions, sponsored participatory experiences are believed to be so important that some have suggested that they should be a universal addition to classroom schooling. (Panel on Youth Report 1973; Konopka 1973; National Panel on High School and Adolescent Education 1976). This approach has been strongly criticized by others (Heyneman 1976; Timpane, et al. 1975).

Required Adolescent Participation

Adolescents are frequently required to participate in family duties. In families without wealth, contributions in such areas as household maintenance and child care are financially essential. However, even among wealthy families, adolescent participation may be required in exchange for support. Requiring assistance in the home is justified in the eyes of the law of both state and church. In the past when many families lived on farms, adolescent participation was unquestioned and universal; today we have to be reminded by professionals that to require participation is as necessary for healthy adolescent psychological development as it ever was (Baumrind 1974).

In communities larger than families, it is also normal to require adolescents to assist in exchange for privileges and opportunities extended to them. Some communities see required participation as essential for maintenance and survival. This is the case in those African countries where school children are required to teach others to read; within Israel's kibbutzim where adolescent as well as adult labor is needed; and among religious communities, such as the Mormons or the World Community of Islam in the West, which require adolescent participation as a normal part of becoming a community member.

Required Participation and Educational Policy

The question I wish to raise is twofold: (1) Is there justification for considering this "required" participation as a part of educational policy? (2) Given that we are a democracy that values free choice, how might we go about requiring participation without being unjust? To answer these questions it might be helpful to examine the viewpoints of several individuals: Margaret Fallers, an anthropologist and educator; James Redfield, a classics scholar; Sidney Hook, a sociologist; and Francis Schrag, a philosopher.

Fallers holds that one purpose of schooling should be to teach the common culture. Deciding what is "common culture" in America is not simple, she admits, especially when a teacher is faced with a class containing a wide variety of ethnic and racial groups. Nevertheless she argues that it is hazardous for adults to not decide anything, and instead turn the problem over to students and ask them to choose what they think is "universal" (Fallers 1970).

Asking that adolescents choose what they wish to learn and what they wish to prepare for certainly may, at least temporarily, ease our moral dilemma with respect to curriculum tracking. When the results are in and we find that social groups are disproportionately represented in different occupational "specialties," we can always cite the adolescent as the cause. After all, wasn't it their choices that precipitated the more socially privileged to choose physics and the less socially privileged to choose auto mechanics? Fallers' objection to too much free choice extends beyond this however; her purpose is to help us define intelligent socialization—intelligent irrespective of race, or class, or region. As she says:

The effect of leaving too much choice to young people is to make them feel insecure, to make them feel that adult society is not sure of itself... they have been taught... since kindergarten that restrictions or requirements are bad and inhibiting to free growth... because the definition of what a "reasonable" student does is so vague, schools are increasingly dependent upon counselors to help students through the maze. Now, even the most generous appraisal would show counselors to be no brighter, no more understanding of our society, and no more seers than the rest of us. The increasing interest in counseling in schools is a sign of weakness, not of strength... It is important that... schools think of themselves fundamentally as socializing institutions—organizations for passing on the culture of the society—not as institutions for individual therapy or individualized training. Although I do not think that they should ignore the individual needs of individual students, they must devote their most creative thinking to deciding how they can best help the next generation to be prepared to carry on the ongoing society (Fallers 1970).

Obligations in School: What to Learn First

If it is intelligent socialization to require children to learn something in common, then we might ask what we should teach that is common among us. There are at least two responses to this question. If we were to follow the advice of Redfield, we would teach all children something about a classic. As he says:

... The loss of the classic... is parallel to the loss of the sacred; both involve the loss of traditional authority, isolate the man of today and throw him on his own resources; both, in celebrating individual conscience and individual achievement, deny man the right to rely upon a greatness which he does not comprehend (Redfield 1976).

There is, of course, more than one classic. We might choose from Homer, the Bible, the Koran, the Bhagavad Gita, and the Torah—all of which have elements in common, both religious and secular. However, if for some reason our courts decide that public schools cannot teach anything religious, then perhaps we should require that students learn the symbolism of our Constitution and the laws that derive from it, for clearly both of these are sacred and represent our common experience.

These are not our only choices, however. As a second option, we could take Hook's advice and require that all

adolescents learn what we decide is "absolutely essential for them to know." Hook would have all adolescents learn to communicate clearly and effectively and acquire a command of their own language, oral and written; understand the nature of their own bodies; and be aware of the history of their society and the political and economic forces shaping its future. His requirements would hold for everyone, regardless of their projected careers and irrespective of whether they are presently aware of these needs (Hook 1971).

Obligations of the School: How To Order Priorities

As educators we must ask ourselves how schools can correctly socialize large groups of young people. I think we would all agree that the answer to this question is not a new course, perhaps entitled, "Ways to Live Correctly." A curriculum of this nature is remarkably ineffectual. What sinks in is the irony, not the liturgy; and this is particularly true when the message is juxtaposed against the chaos heard and felt in nearby hallways and restrooms. Revising the curriculum will not affect behavior.

There are two answers. At the very least, students should be forced to adhere to the same legal and behavioral codes as their teachers. Baumrind (1974) reminds us that "crimes committed within the high school setting should be punished just as rigorously as crimes committed in any other setting," regardless of an individual's race or social experience. Such acts should be punished whether the crime is assault, public obscenity, extortion, or disturbing the peace. Adults who commit these crimes are punished. To not apply laws to adolescents is morally unfair to the victims and to the society. The rights of adults and nonadults to work hard and in peace should be at least as available in school as anywhere else.

Furthermore, confusion in schools, particularly in the United States, stems from our unwillingness as adults to order priorities. In some way we must force ourselves to decide what our educational priorities are. Are shop and driver's education really just as essential as biology and language? Students are confused by the lack of clear guidelines on what they must learn in order to function in the world outside of their schools. In some schools students are denied the privilege of participating in team sports unless they maintain a specified level of academic achievement; rarely are students prevented from wasting their time on nonessential subjects, even when they are failing in more important areas.

Public Policy Outside of Schools

I began the discussion of adolescent obligations with the schools and their curricula not because these are the most important elements in children's lives, but because they are the most central point of contact between the public and the individual child. In addition to being the most widely recognized contact, they are a good illustration of obligations, because we probably would all agree

that adolescents should learn something in common in exchange for our social protection. Having established that it is moral for the public to place some priority on what children learn and how they behave, however, we must also ask ourselves if our schools are the only arena.

To answer this question, we might first turn to Schrag. He reminds us that there are universal differences between a young child, an adolescent, and an adult. These are the differences to which I refer when speaking of a social policy geared to adolescents. An adolescent is a youth who is below the legal age of adulthood (Heyneman and Daniels 1976). Schrag's reasoning illustrates why an adolescent is not a child. A child is more dependent, physically and emotionally. A child might run in front of a car before s/he can understand streets. Thus three-year-olds cannot be allowed to drive trucks, for they would be a danger to themselves and others.

An adolescent differs from a child in that s/he is more capable. The development of competence is far from even; some 15-year-olds are less mature than some 14-year-olds. But, the normal 15-year-old is more able than an 8-year-old. As children grow older, the more capable they are of assisting their communities; therefore, it is right to require that adolescents fulfill social obligations and to give adolescents special privileges not yet afforded children.

Yet, no matter how capable adolescents may become, the fact remains that they are not adults and should not be treated in precisely the same way as adults. There is a sound legal distinction between an adolescent and an adult; and the praiseworthy movements in the 1960's to grant political power to "powerless" persons, such as women and minorities, should philosophically stop at the criterion of age (Baumrind 1974). Thus, the legal concept that divides an adolescent from an adult is not to be based solely upon science, for many adults retain adolescent characteristics and many adolescents possess adult characteristics. Instead the distinction is normative. It is correct to decide upon an age under which an individual deserves special protection. Whether we define adolescence as being 15, or 18, or 21, and no matter how much we wish to have them participate in decision-making, the category of adolescence must remain. Our society is passing through a healthy period in which we are trying to decide what is and is not reasonable to expect from normal adolescents. But we must remain aware of this fact: for nonadults social policy will always have to contain an element of what Fallers calls "indoctrination," and, by itself, this is not wrong.

Recent policies have extended new rights and privileges to adolescents on the grounds that to deny these rights and privileges will somehow inhibit the transition to adulthood. New opportunities are sponsored on the grounds that not supplying them will result in anomie.

(Concluded on p. 432)

years later so my sons would perhaps realize that they were not the first college freshmen to be frustrated.

My good fortune in being assigned to Klinge's biology class was shared by many other students, and I often asked Paul if he shouldn't have stayed in teaching. He was cognizant of the general dilemma of great teachers being removed from teaching, and his feelings about his own case were mixed. There will probably never be enough Paul Klinge's to go around, but for me, he represented a standard for what is possible in the education of young people.

I like to think that Paul is standing around somewhere checking out the scene, making sardonic comments, and generally feeling pleased with himself that a lot of people feel he spent his time well.

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resentment, alienation, and ultimately, in social deviance. Clearly there is enough evidence today of social deviance to justify our fear of it, but, the question that continues to nag us is whether social deviance exists because of blocked opportunities and insufficient choice, or whether it exists for exactly the opposite reason—too much independent choice and too little guidance from the community, the church, the culture, the family, and the race. As Wilson says, "There is absolutely no reason to believe that extending rights will reduce violence. Indeed, there is as much evidence against as in support of that proposition" (1977).

Scholars disagree intensely on this point. Because they disagree, it is important to examine our policy and see if it reflects both sides. So far, public policy has been unbalanced. Though there have been many gains in the realm of new rights and privileges, there have been no new extensions of adolescent obligations.

The wider principle is that there are two elements with respect to policy on adolescence and two modes through which the wider society can encourage adolescent participation. One is sponsored, and on the adolescent's part, voluntary; the other is required, and on the adolescent's part follows in exchange for privilege and protection. Both styles should be encouraged in public policy, for without both, public policy will remain out of balance and ineffectual.

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Conservation

To waste, to destroy, our natural resources, to skin and exhaust the land instead of using it so as to increase its usefulness, will result in undermining in the days of our children the very prosperity which we ought by right to hand down to them amplified and developed.

Every man holds his property subject to the general right of the community.

Theodore Roosevelt

Our primary task now is to increase our understanding of our environment, to a point where we can enjoy it without defacing it, use its bounty without detracting permanently from its value, and above all, maintain a living balance between man's actions and nature's reactions, for this nation's great resource is as elastic and productive as our ingenuity can make it.

John F. Kennedy

Selenium

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level to about 0.3 ml selenium per kg of food. They cannot explain how selenium protects against cancer except that it is a component of the glutathione peroxidase enzyme system that prevents oxidation of unsaturated fats to peroxides and free radicals, both of which are believed to play a role in the cancer process.

In contrast to the availability of experimental data on animals, studies on humans are limited to statistical rather than experimental findings, but they appear to indicate significant trends. Some researchers (Shamberger and Frost 1969; Shamberger and Willis 1971) reported a lower incidence of cancer in individuals from seleniferous areas than in those from nonseleniferous areas, sampling the same size population in both areas:

	Females	Males
Low-seleniferous areas	165.5	191
High-seleniferous areas	142.0	171.5

Shamberger *et al.* (1973) reported lower than average concentrations of selenium in some cancer patients, their blood levels averaged 75 percent of normal; though patients with some forms of cancer had normal blood levels, at no time did they find elevated selenium levels in cancer patients. Revici (1955) reported that selenium actually benefits cancer patients and that the most successful palliative effects were obtained by giving bivalent selenium with synthetic lipids when treating lipid imbalance associated with cancer.

However, there is no universal agreement as to the role of selenium in cancer treatment. Exon, Koller, and Elliott (1976) reported that selenium has no effect on neoplasia induced by the Rauscher Leukemia virus in mice. Coles (1974) reports that selenium reacts with carcinogens and is carcinogenic, but Schroeder, Frost, and Balassa (1970) believe they have evidence that selenium inhibits human malignancies. If more positive proof for the beneficial effect of selenium upon cancer should become available, it would open new vistas of cancer research and treatment; but at present it is presumptuous to regard selenium as a panacea for malignancies of any origin.

The role of selenium in human metabolic pathways remains an enigma, and though numerous studies have been made by biochemists, physicians, and other investigators, a consensus is lacking in vital areas of research. To date there is not a satisfactory method for diagnosis and treatment of selenium toxicity in humans. Thus, a question that needs an answer is: what, if anything, needs to be done for the relatively large population living in seleniferous areas, and whose livelihood depends upon farming, ranching, dairying or other soil-dependent industry? Many investigators doubt that toxicity is a problem and see selenium deficiency as the greater threat, although to date there are conflicting ideas as to the advisability of adding selenium to the human diet. No

evidence suggests that the food supply in the United States contains either too little or too much selenium, and there is reason to suspect that the indiscriminate selenium supplementation of the diet is risky at best. An understanding of selenium in human biochemistry is badly needed to minimize possible hazards, and maximize the beneficial use of this element. Meanwhile, current research has banished some apprehensions and raised many questions, and we look to the future for answers and for ways in which selenium may improve human health.

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