

Nuclear arms education: the urgent need

The articles in this special issue on Nuclear Arms Education are intended to provide background information for efforts at educating students and the general public about the issues involved in the threat of nuclear war. It is obvious that there is a great need for these efforts.

For example, one issue about which the public needs to be much better informed is the relative capability of the opposing nuclear forces. Thus the article "The nuclear arsenals of the US and USSR" in this issue (page 43) compares the number of warheads and delivery vehicles comprising the strategic nuclear forces of the US and the Soviet Union. It is clear that by some measures the US is superior, by other measures the Soviet Union. This conclusion is in accord with the report of the Defense Department for fiscal year 1982 which states, "The United States and the Soviet Union are roughly equal in strategic nuclear power." The chairman of the Joint Chiefs of Staff, on being questioned in the Senate, stated that he would not trade US military capability overall for that of the Soviets.

But observations based only on comparing numbers of the opposing forces do not identify a significant qualitative difference—namely that the US is much better prepared than the Soviet Union to deter a nuclear war. The reason is that most of the US nuclear force is invulnerable. More than half of it is in missiles on "invulnerable" submarines; another quarter will soon be in cruise missiles on bombers, many of which could survive a Soviet first strike. By contrast, 75% of the warheads of the Soviets are on vulnerable ICBMs. It is important that citizens become informed about not only the gross numbers involved in the arms race but also the more subtle qualitative factors.

Another area of the arms race that is particularly worrisome and about which the public is especially ill-informed is the possibility of hostile military operations in space. The first victim of such an exchange would be intelligence satellites. But these satellites are absolutely essential for our security. They are the most important means by which we can know about weapons developments in the Soviet Union, while the Soviets need only read *Aviation Week* to know about our developments. Because we have intelligence satellites, we can verify whether the Soviets are obeying most kinds of arms-control agreements. The satellites give us good information about the threats we have to be prepared for. Before the advent of satellites, we imagined that there was a "missile gap" in favor of the Soviet Union, which we then found did not exist. Conversely, if the Soviets were ever to deploy a

completely new weapons system, the satellites would reveal it to us.

It would be absolutely tragic if we were to jeopardize the intelligence satellites in any way. We have, therefore, every interest in preventing the deployment of antisatellite systems. In August 1981 the Soviet Union submitted to the United Nations a draft treaty forbidding the stationing in space of any kind of weapons. It is regrettable that the US government has not responded to this Soviet initiative.

At present there are two important negotiations going on in Geneva. In the negotiation about nuclear forces in Europe, Chairman Andropov made a new proposal in December offering substantial reductions in medium-range missiles; this proposal looks worthy of close examination. In the negotiations about strategic nuclear forces, neither the US nor the Soviet Union have made satisfactory proposals as yet. The Soviet plan calls for too small a reduction of forces (from 2250 to 1800 delivery vehicles) and proposes to take a very long time to accomplish this reduction. The US proposal requires relatively much greater sacrifices in weapons from the Soviets than from US and has therefore been rejected by the Soviets.

Again, public citizens should be made aware in detail about these possible developments and negotiations in the arms race so that they can make their views known.

Education about the arms race and arms control is best done by a combination of physicists and specialists in government. The education should be on two levels. First of all, it is essential to give a large number of students and the general public a broad understanding of the issues, including the history of the arms race and of attempts at arms control, the effects of nuclear weapons, the relative armaments of the two opposing powers and criteria to judge a fair arms-control treaty. On a second level, we need to prepare a very few students for active careers in the area of arms control.

We physicists are especially qualified to clarify information about the arms race because we, more than any other group, are involved in understanding and quantifying the essential features of physical systems. It is not necessary to have access to classified information; the relevant facts are published (many of them in this special issue). What physicists can do is to work at putting these facts in perspective for the general public—an urgent need seldom addressed by this or previous Administrations.

HANS A. BETHE
Cornell University