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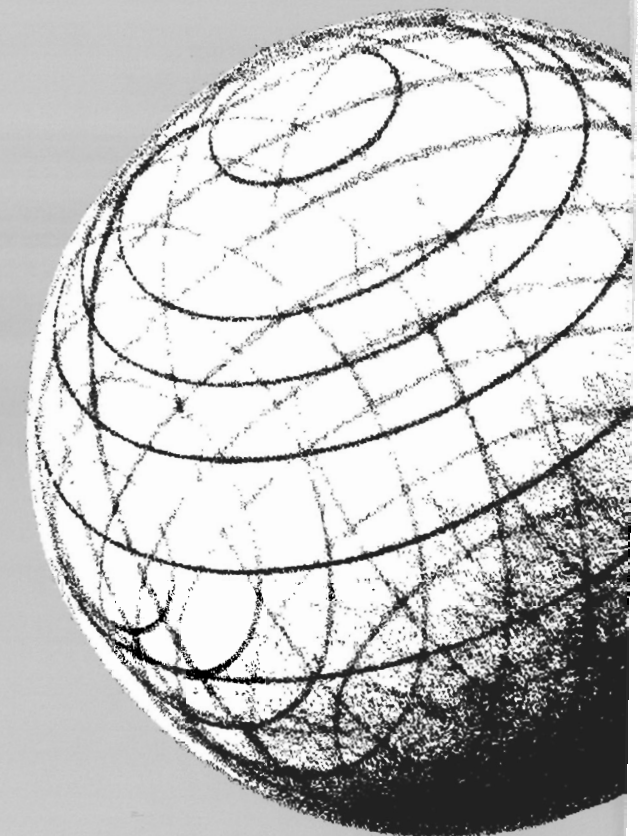


University of California
Institute on Global Conflict
and Cooperation

IGCC Policy Paper No. **6**

THE UNIVERSITY AND THE NUCLEAR PREDICAMENT

**Walter Kohn and
Lawrence Badash**



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University of California
Institute on Global Conflict
and Cooperation

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THE UNIVERSITY AND THE NUCLEAR PREDICAMENT¹

ABSTRACT

This paper discusses the reponse of the university, as an institution, to the "nuclear predicament," i.e., to the threat of a major nuclear war and its implications. The subject is treated in a rather broad context including teaching, research, conferences, community education, etc., at universities in the United States and Canada. The main emphasis, however, is on undergraduate education. The authors' own institution, the University of California, is examined in the greatest detail. A very limited statistical analysis is presented. The authors conclude that the university's role is still very inadequate and they estimate the magnitude of the required additional efforts. The paper ends with a long list of suggestions for making the university more effective in responding to the nuclear predicament.

I. THE PROBLEM

On August 6, 1945, a U.S. Army Air Force plane dropped a single atomic bomb equivalent to twelve and a half thousand tons of TNT on the center of Hiroshima, resulting in about 80,000 prompt fatalities. The vast destructive power of the nucleus had been demonstrated and the human condition was forever changed. Today the world's nuclear arsenal consists of about 50,000 warheads, many of them ten to one hundred times more powerful. In a major nuclear exchange a substantial fraction of the world's population would lose their lives, civilization as we know it would very possibly be destroyed, immediate ecological damage would be enormous, and long-lasting radioactive elements would poison the surface of the earth for decades, some contaminants lasting even thousands of years.

In parallel with the danger of a world-wide nuclear holocaust, a number of other major global problems have become acute: world population is doubling approximately every thirty years, the production of carbon dioxide has reached a scale where it is expected to have significant impact on world climate, essential energy and other resources are being exhausted on a time scale of tens to hundreds of years, and the gulf between the living conditions in the developed and less-developed world (or between the so-called "North" and "South") continues to widen.

While this formidable array of crises has arisen, our globe has also witnessed spectacular positive developments pointing the way to a new and promising stage of human history. Air travel, satellite communication, space exploration, international cooperation in areas such as health and food supply,

all have contributed in an unprecedented way to a sense of world-wide community.

These multiple changes have come upon us over a period of little more than one generation—a speed to which, by and large, our political and social institutions have been unable to respond sufficiently promptly and deeply.

The great issue before us is whether and how we shall be able to avert the threats—especially the nuclear threat—and start building a better, new civilization with strong, constructive, transnational ties. We call this issue the nuclear predicament.

In this paper we shall focus primarily on the threat of nuclear war, mindful however of the broader context, within which it represents the potentially most immediate and devastating danger.

The record of our *political* institutions since Hiroshima has been mixed. On the positive side are the fact that a nuclear war, indeed any war on a global scale, has been avoided; that—with some interruptions—discussions aimed at avoiding such a war have been going on; and that a number of arms control agreements have been reached. On the negative side are the proliferation of nuclear weapons states (from one to at least five at this time, with the potential for several more); the senseless size and lethality of nuclear arsenals; and the frightening reduction of the time available for decision making (tens of seconds in the context of the Strategic Defense Initiative), accompanied necessarily by heavy dependence on computers. Unless there is a radical change in direction, it is our opinion that a nuclear war, accidental or otherwise, is all but certain to break out, if not in our lifetime then in the next one or two generations. A large fraction of the American people share this view.

Among *social* institutions in the United States which have clearly recognized the unprecedented danger and vigorously responded to it, we want first to mention a substantial fraction of religious denominations, most notably the Catholic Church. In their 1983 pastoral letter, entitled “The Challenge of Peace,” the United States Catholic Bishops presented an in-depth analysis of the religious and ethical dimensions of what they called “the new moment” in the history of man and his relationship to God.² The letter also took a clear and, in our view, very constructive position with respect to concrete strategic issues such as deterrence, disarmament, first strike, a comprehensive test ban, and strikes against civilian populations. Several Protestant and Jewish denominations have also taken well-defined and constructive positions, a smaller number of fundamentalist denominations have taken a deliberately passive position vis-a-vis the nuclear issues, and a few churches have even welcomed a future nuclear war as an expression of God’s will.

Another social group which has had a considerable impact is the medical profession. Physicians for Social Responsibility has significantly contributed to public appreciation that nuclear war is not just another war but rather the “last epidemic.” They have made it clear that in a nuclear war medical needs would be

The above-listed approaches to make the university more effective with respect to the nuclear predicament are all entirely realistic. By a vigorous pursuit of one or more of these directions (and of others), depending on local circumstances, U.S. universities could, if they so decided, go far in meeting their responsibility. Our acquaintance with the national situation suggests that, depending on local circumstances, an increase in effort by a factor of two to ten is needed.

The urgency of the problem may, however, call for more dramatic and innovative initiatives, as was the then new concept of the Peace Corps, in the 1960s. Let us put forward one such idea. It should be possible to create, for instance, a U.S.–U.S.S.R. summer exchange program, involving 10,000 students on each side, with a U.S. budget of the order of forty to sixty million dollars, administered under the supervision of the United States Institute of Peace. Or, along the same line, a massive faculty exchange program. The costs of such major initiatives would, in fact, be extremely small, a minute fraction of one percent, when compared with the overall operating budgets of U.S. universities. We hope that some of our readers will generate—and pursue—other innovative ideas.

By doing immediately what is now possible (in fact, a great deal) and moving on to bold new initiatives, we believe that the university can and will play its essential part to cope successfully with the nuclear predicament.

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institute for about thirty high school teachers, to enable them better to present the subject to their own students. This institute also was judged as very successful by its students. A second seminar at Davis and a new one at UC Riverside in summer 1987 were also very well received.

19. *Publications.* Publications, ranging from scholarly articles, to monographs, conference proceedings, text books, popular books, special journals, and contributions to magazines are appropriate vehicles for creating better understanding. They are usually prepared by individuals or co-authors. Sometimes they are group projects, like *Hawks, Doves and Owls: An Agenda for Avoiding Nuclear War*,³⁸ prepared by Harvard's Avoiding Nuclear War Project. A useful partial bibliography is found in *Peace and World Order Studies*.³⁹
20. *Obtaining private community funding.* Virtually every community has citizens who are deeply concerned about the global nuclear predicament. We know of many examples where private citizens provided significant support for university nuclear activities. The UC Santa Barbara Global Peace and Security Program, for example, was given a subsidy to publish one year's public lectures; a "Peace" chair at UC Irvine was endowed; funds for a peace chair at the University of Toronto are being accumulated.
21. *Obtaining state support.* The UC Institute on Global Conflict and Cooperation has been receiving about 0.6 million dollars per annum directly from the state legislature (in addition to a similar sum from the university, as well as foundation support.)
22. *Obtaining foundation funding.* Fortunately a number of foundations have established substantial programs in support of university peace activities, at a total level of many tens of millions of dollars per annum. Included in this category are the Ford Foundation, the MacArthur Foundation, the Carnegie Corporation, the Sloan Foundation, and the Ploughshares Fund. Individuals, as well as programs and institutes, have received grants, and the amount has dramatically increased over the last five years. This trend may be expected to continue. A listing of relevant foundations is in *Peace and World Order Studies*.⁴⁰
23. *The United States Institute for Peace.* This institute, established by Congress in 1984, since 1986 invites grant proposals for academic programs in the peace area. Its present funding is extremely modest, about 4.1 million dollars/annum,⁴¹ and its policy board is controlled by the Executive Branch of the U.S. government. At this time it is too early to tell whether it will become a significant force. The potential exists, and universities, through whatever channels are available to them, should work towards giving it a significance at least comparable to the U. S. military academies.

on a wholly unprecedented scale and that, at the same time, medical help would be largely unavailable.

There are many other national citizens' and professional organizations concerned with nuclear war, such as SANE, the Council for a Livable World, Beyond War, the Union of Concerned Scientists, and the Federation of American Scientists, as well as hundreds of local groups such as the Nuclear Age Peace Foundation and the Peace Resource Center in our own community of Santa Barbara. These have had a significant moderating influence on public opinion, and several of the national organizations have also, from time to time, considerably influenced Congress and the Administration.

Finally we come to the educational establishment. A number of school districts, such as San Francisco, Milwaukee, New York City, Baltimore, Los Angeles, and San Diego, have introduced or are in the process of introducing nuclear age education at the junior and senior high school level. For example, the Union of Concerned Scientists collaborated with the Massachusetts Teachers Association and the National Education Association to produce "Choices: A Unit on Conflict and Nuclear War," for the junior high school level; and members of the Graduate School of Education at the University of California, Santa Barbara, developed a course for high schools. There are many other similar developments. However, as far as we can judge, the impact of these programs on high school students is as yet quite small.

The remainder of this paper will be devoted to the role of the university as an institution in dealing with the nuclear predicament.³ We shall conclude that, while some significant programs exist, academia as a whole has fallen far short of reacting to the nuclear challenge with the energy and creativity which it could marshal, if so willed. We shall also discuss numerous avenues for future actions.

II. HISTORICAL BACKGROUND

We begin with the briefest sketch of the evolution of the university and of its role in society.

The first European universities, modeled on Islamic institutions, were guilds of masters and students operating under formal authority and with a clearly practical goal in mind. The oldest, at Salerno, was created in the eleventh century as a medical college; Bologna began as a law school; Montpellier developed from both these academic areas; the University of Paris, the Sorbonne, grew from less organized institutions, but eventually developed into faculties of arts, theology, law, and medicine; Oxford was modelled on Paris; and so on. The new professionals—physicians, lawyers, and clergymen—filled well-defined roles in society; graduates of the arts faculty engaged in teaching and a wide variety of other activities.

There were, however, few—if any—clear examples of medieval univer-

sities which took institutional initiatives to help solve major problems of contemporary society, such as hunger, poverty, disease, or defense.

During the Renaissance (ca. 1300–1500) and the Early Modern Period (ca. 1440–1789), the more conservative graduates of the universities sought to mitigate the upheavals caused by new currents of theology and nationalism,⁴ while the more progressive ones explored the new worlds opened up by the telescope, microscope, and other instruments and practices of the Scientific Revolution.⁵ However, again it was not the university, as an institution, which sought to move society in one direction or another; its function was to produce educated individuals.

Historians of our century have taken several, quite different views of the role of the university in society: some ignore the issue entirely,⁶ others focus on the valuable new accessibility of the university to large numbers of laymen,⁷ still others conclude explicitly that the university as an institution has not easily responded to social needs.⁸ In our view there is no question that the university has played a valuable role in society through the exercise of its normal modern functions: transmission of knowledge, creation of new knowledge, education of professionals, and preparation of students for the intelligent exercise of citizenship. Yet, generally, the modern university has not deliberately attempted to ameliorate the widespread problems of society or attend to its goals.

In the United States, the most important exception came with the passage, in 1862, of the Morrill Act. Based upon concepts of liberty of action, equality of opportunity, and social and economic democracy, this legislation provided land grants for the establishment of state colleges to teach agriculture and the mechanical arts. Since the society was largely agrarian, the benefits flowing from the colleges and the agricultural experiment stations accrued to the entire society. Although the universities did not take the initiative in this extremely important development, they played a crucial role, as institutions, in dealing with a great national issue.⁹

In the U.S. and elsewhere the creation of new schools of engineering during the nineteenth century (e.g., at Cambridge University, Rensselaer Polytechnic Institute, Massachusetts Institute of Technology, the Sheffield Scientific School at Yale) were the result of conscious corporate decisions by trustees to support a clearly perceived societal goal. In the early twentieth century, before World War I, the threat to the British economy by foreign competition led their universities to redesign curricula, the better to fit graduates for this challenge.¹⁰

During World War I, many universities mobilized facilities and expertise for the war effort. Improvements in explosives, the treatment of battlefield wounds, the production of acetone, and—most notoriously—the development of several types of poison gas in World War I highlight the sort of activities engaged in by universities and their personnel.¹¹

World War I was often called a “chemist’s war.” Two decades later physics would show its capabilities. At the MIT Radiation Laboratory and in the United

cultures. One of the important obstacles to progress on the nuclear predicament is the inadequate understanding by Americans of Communist and non-Western perspectives. Inclusion of one or more courses in this area in the general education requirements (as on our campus) is an appropriate response.

15. *Study of a foreign (especially non-Western or Russian) language.* This is similar to the previous item, but worth listing separately. Even when a language is taught from a strictly pragmatic (and not a cultural) perspective, it opens the door to a more global point of view. In fact, it is our impression that foreign language requirements, which had been on the wane, have been making a slow comeback (e.g., their recent restoration on our campus).
16. *Education abroad.* The value of education-abroad programs in broadening students’ perspectives beyond their national confines is widely appreciated. Here we would like to emphasize the special value of programs in non-Western and/or Communist countries and of the inclusion of explicit elements relating to global peace. Since 1985, in cooperation with IGCC, the University of California’s Education Abroad Program has been conducting ten-day seminars on “The Nuclear Arms Race” in Dubrovnik, Yugoslavia. (In 1987 it “cloned” this effort in Tokyo.) About twenty UC students are joined by an equal number of foreign students for lectures by, and discussion with, an international group of professors. The Americans have benefited by an increased awareness that not only Warsaw Pact members, but allies from NATO have very different perspectives on the past, present, and future of the nuclear dilemma.
17. *Internships.* In the “nuclear” field which is of such immediate relevance, the educational value of internships is especially great. As examples we refer to the internships of the IGCC with private and government institutions and to the internship program of the University of Waterloo, Ontario, Canada, including \$1,000 support by the university.
18. *Teaching seminars.* Both the University of California and Harvard-MIT conduct annual two-week institutes for university teaching staff (from their own as well as other institutions) to prepare them for research and instruction in the “nuclear” area. Scholars and practitioners in arms race/arms control issues discuss their work with the seminar “fellows,” who number about thirty in the UC program. A wide variety of academic disciplines is represented, and the fellows thus gain as much from each other as from the lecturers. These seminars have been conducted for several years and have been extremely well received.

UC Davis, in the summer of 1986, conducted its first teaching

resources into an annually updated register of all U. S. university activities in the area of peace, including, of course, nuclear peace.

7. *New and modified courses.* Many institutions, but not nearly enough, have in recent years introduced *new* courses addressing the nuclear predicament. Opportunities also exist for *modifying* existing courses. A striking example is a course on basic English composition at UCLA which now is based on a reader entitled *The Nuclear Predicament*.³⁵ Seventy new course syllabi are listed by UCAM.
8. *Campus institutes or programs.* Examples of "nuclear" institutes and programs were described in the text. In general we recommend that such activities should start out by integrating primarily *existing* activities, supplemented by a few additions where needed. As time goes on and experience is accumulated, appropriate further additions may be undertaken.
9. *Multicampus umbrella organizations.* Such organizations can provide support for small single-campus activities and result in a more efficient use of human and financial resources. Examples are the UC Institute on Global Conflict and Cooperation, the All-Canadian Science for Peace organization³⁶ and the Wisconsin Institute for the Study of War, Peace and Global Cooperation.³⁷
10. *Specialized multicampus groupings.* Examples are the joint Berkeley-Stanford program on International Institutions and Cooperation and the Harvard-MIT Summer Program on Nuclear Weapons and Arms Control.
11. *Cooperative projects of university and non-university groups.* Since 1970 the California Institute of Technology and the Rand Corporation have jointly conducted the California Seminar on International Security and Foreign Policy. A quite different example is the fortnightly Faculty Seminar at UC San Diego, with participation of a substantial number of members of the community.
12. *Individual faculty research projects.* Here academia can play an important role by the results of such research, the training of graduate (or undergraduate) students and/or of postdoctoral scholars, and finally by drawing the attention of the campus and broader community to the importance of the nuclear issue.
13. *Lecture series.* Here a variety of formats are possible, e.g., evening lectures open to the campus and general public, regular lunch meetings, occasional (once a quarter or year) major events with audiences of thousands such as the Dalai Lama at UC Santa Barbara. A series of lectures around a theme can attract a loyal audience. At UC Santa Barbara this was the case with "The Effectiveness of Scientific Advice to Government."
14. *Courses dealing with Communist and/or non-Western societies and*

Kingdom radar was developed for military use. At the Johns Hopkins Applied Physics Laboratory the proximity fuse was perfected.¹²

The war's most awesome weapon was, of course, the atomic bomb. Research began by individual initiative at various universities, and was institutionally formalized at a stage when funding or the size of the project or a policy decision required approval by the administration. At Columbia University, for example, Harold Urey and John Dunning led the investigations in isotope separation, while Enrico Fermi and Leo Szilard endeavored to achieve a chain reaction in natural uranium. After the United States entered the war, most nuclear research was concentrated at the University of Chicago and the Metallurgical (a code name) Laboratory's director, Arthur Holly Compton, kept the university's president more or less informed of its purpose and progress. Nuclear reactor development, isotope separation, and the production of plutonium became the main goals of the Chicago group.¹³ In effect, these universities deliberately lent their facilities and personnel to the government.

By mid-1942, it became clear both to the scientists and to those directing the project from Washington that a separate laboratory was needed for the design and construction of the effort's ultimate goal: nuclear weapons. Under the scientific leadership of Robert Oppenheimer, uranium and plutonium fission bombs were fashioned, which were used against Japan in August 1945. The Los Alamos (New Mexico) laboratory, where this work was done, was a military reservation situated, for security purposes, in a remote location, but most of the technical personnel within the fence were civilians.

The U.S. Army's Corps of Engineers, in charge of the project, was accustomed to hiring civilian corporations to build and run its facilities. Thus, a construction company such as Stone and Webster, and chemical companies such as DuPont and Union Carbide, were major actors at the huge industrial enterprises producing uranium-235 at Oak Ridge, Tennessee, and plutonium at Hanford, Washington. Los Alamos had no need for major construction or production assistance from private industry. It did need administrative support, however, for employment, payroll, purchasing, housing, and the many facets of conducting business at an installation whose population rose to 5,000 by the end of the war. We do not know why the University of California (UC) was selected as prime contractor, but the explanation may simply lie in the circumstance that Oppenheimer and another early leader in the project, Ernest Lawrence, both were on the UC faculty.

Acting first under a letter of intent from Vannevar Bush's Office of Scientific Research and Development, effective January 1, 1943, and then under a formal contract with the Manhattan Engineer District of the War Department, UC appointed a business manager for the laboratory, and established a special purchasing office in Los Angeles to receive orders via mail and teletype from Los Alamos.

III. THE CONTEMPORARY SCENE

After Hiroshima, a small number of university institutes dealing with Russian studies, international studies, security studies, etc., initiated activities dealing with the nuclear predicament. Important examples are the Russian Institute¹⁴ and the Research Institute on International Change at Columbia, the Russian Research Center and the Center for Science and International Affairs at Harvard, the Defense and Arms Control Studies Program of MIT's Center for International Studies, the Institute for International Studies at Berkeley, and the Center for International Security and Arms Control at Stanford.

All these institutes have contributed to three of the traditional university functions: research, teaching, and public service. Teaching has been emphasized in seminars for graduate and/or postgraduate students, and public service was provided by faculty involvement in government affairs and the training of students for government service. Management of the Los Alamos and Livermore weapons laboratories by the UC has already been mentioned. The university justifies this function as an appropriate form of public service.¹⁵

Many of these activities go back several decades. Much more recently, roughly since the late seventies, there have been deliberate efforts by a few universities to provide *undergraduates* with education about the nuclear predicament as part of their general education. These initiatives were undertaken out of the realization that it is essential for students to appreciate the urgency of the problem and to have a basic understanding of the new nuclear realities. In the present paper we deal with all of the university's nuclear roles, but with particular attention to undergraduate education.

A. The University of California

We shall describe in considerable detail the responses of the University of California to the nuclear challenge because, firstly, it is our home institution and therefore best known to us, and, secondly, it is one of the more prominent state universities, with nine campuses and a total enrollment of 150,000 students.

The nuclear weapons laboratories. After World War II came to an end, UC continued the management of the Los Alamos Laboratory, which thus began its singular existence as a kind of weapons campus of the university. A few years later, in 1952, because Edward Teller and others doubted Los Alamos' commitment to the development of a hydrogen bomb, the Livermore Laboratory was added, with Teller—though titularly only Associate Director—in fact as its primary scientific guiding spirit.

This administrative structure has remained for over four decades until today, with UC as the contractor for the laboratories' current "owner," the Department of Energy. (In fact, almost incredibly, Teller—now seventy-nine

bers, can succeed. A striking example is Student Pugwash,³³ the brainchild of a junior in the UC San Diego Political Science Department, now in its eighth year of existence. It is dedicated to education about the interaction of science, technology, and society. It has conducted week-long international workshops of students in close contact with leaders from academia, science, technology, and politics, at UC San Diego, Yale, Berkeley, etc. It has chapters on numerous campuses and publishes a tri-monthly journal, *Tough Questions*. Active student support is also very important for the success of faculty-initiated projects.

3. *Leadership and active support at the highest administrative levels.* Any new academic activity outside of traditional disciplines is quite likely to be opposed by a majority of the faculty, which is generally very conservative in academic matters. Under these circumstances support at the highest administrative levels can make a major difference in whether the activity succeeds. Examples are the previously cited support of a dean for the UC Santa Barbara program on Global Peace and Security; President Bok's support of Harvard's Nuclear Study Group, including his introduction to the influential book, *Living with Nuclear Weapons*;³⁴ the financial support, from his discretionary funds, by Chancellor Sinsheimer of UC Santa Cruz, of the production and distribution of an anthology called the *Nuclear Handbook*. Finally, we cite again the leadership by the Regents and the president of UC, who were instrumental in establishing the statewide Institute on Global Conflict and Cooperation.
4. *Faculty committee receptivity.* Any new academic activity will undergo scrutiny by one or more faculty committees. Typically, and in our view properly, such committees are usually academically cautious. After all, radically new proposals which make good sense are quite rare. Members of such committees can play an important role if they understand the *critical* need for university activities in the nuclear area and can move their colleagues to a more receptive attitude, while maintaining desirable standards.
5. *Leadership by national educational organizations*, such as the American Association of University Professors, the American Association of University Presidents, etc., can and should play a leadership role in drawing attention to and facilitating university involvement in the nuclear area.
6. *Regional and national networking.* This is already taking place to some degree, and very usefully, as exemplified by the previously mentioned organizations, UCAM and COPRED, and publication of *Peace and world order studies*. We urge that the United States Institute of Peace, established in 1985 by Act of Congress, put its prestige and

on a wide range of subjects including proliferation, Canadian response to SDI, the Contadora process, etc. In 1985-86 it awarded thirty-six research grants.

A second national organization, independently organized and funded, is Science for Peace, headquartered at the University of Toronto. It has chapters on seven other campuses stretching across Canada and publishes a monthly bulletin. The chairman is A. Ignatieff, former chancellor of the University of Toronto and former ambassador to the U.N. The chapters foster educational, research, and public information activities on their campuses. The scope of these programs is usually *not* limited to science.

At least two Canadian universities have formal peace programs. The oldest one (since 1977) is the program on Peace and Conflict Studies at the University of Waterloo, in association with Conrad Grebel College (Mennonite Church). This program is available as a minor or concentration in conjunction with an academic discipline. Subsidized internships are available. The University of Waterloo has an enrollment of over 25,000 students.

A new four-year "Specialist Programme" in Peace and Conflict Studies has just been established at the University of Toronto, with a student body of 51,000. It rests on the concept of a four-way approach to peace: psychological, ideological, strategic, and systemic. The director is Professor A. Rapoport, a distinguished mathematician and psychologist with a long record in the area of peace studies. Twelve courses are required for completion of the program.

IV. THE FUTURE

Of course we cannot foresee what universities will in fact be doing about the nuclear predicament five, ten, or twenty years from now.²⁸ However, we shall present a rather long "shopping list" of suggestions of what, in our opinion, universities could and should do to play their part in averting a nuclear catastrophe. Almost all items have already been touched on in previous sections. We hope that the reader, who is interested in having his/her institution become more effective in this area, will find a number of useful items. Since "apples and oranges" will be freely mixed, little importance should be attached to the order.

1. *Faculty leadership.* Academic matters are primarily the responsibility of the faculty. Accordingly, faculty must assume a leadership role in developing "nuclear" activities in the university. In addition to examples mentioned earlier in this paper, other examples may be found in *Peace and World Order Studies*²⁹ and in publications by UCAM,³⁰ COPRED,³¹ *Physics Today*,³² etc.
2. *Student leadership.* Student proposals in academic matters are usually met with great scepticism or outright rejection by faculty and administration. However, student initiatives, if carefully thought out and, if possible, supported by one or more prestigious faculty mem-

years old—still has enormous influence over the scientific and technical strategies of Livermore!)

Why does a marriage between such unlikely bedfellows as a major university and top secret nuclear bomb laboratories, which originated as a temporary war-time expedient, continue after over forty years of peace? This question is all the more puzzling as UC's management contract has been reviewed and renewed every five years. A full discussion of this extraordinary relationship would take us too far afield, and we cite only briefly the key issues around which the discussion has turned.

The advantages to the laboratories include: sharing in the prestige of the university—a major factor in their recruiting ability; significant two-way interaction with many of the university's outstanding scientific and technical faculty; and an incremental aura of scientific and technical neutrality derived from their identification with a scholarly institution.

For UC the advantages include: access to the laboratories' outstanding, often unique, facilities (supercomputers, high pressure and temperature capabilities, etc.); easy interaction with some of the laboratories' highly sophisticated scientists (e.g., creators of computer codes for nuclear hydrodynamics, highly relevant to astrophysical research); good opportunities for student assistantships, faculty consultantships, and summer employment; an opportunity to perform what many perceive as an important public service, particularly with regard to the laboratories' basic research;¹⁶ and, finally, although the university's management fee is extremely modest (7 million dollars in fiscal year 1986), it may be disposed freely for many projects (including cultural activities), which would not be easy to fund in other ways.

The objectors to UC's continued involvement with the laboratories have stressed the inappropriateness of the institutional involvement of a university, committed to openness and academic freedom, with organizations whose primary activities are secret; the incompatibility of the basic mission of the university—education and academic research—with the primary mission of the laboratories, which is the design and production of weapons of mass-annihilation; the harm done by the hypocrisy and mercenary attitude of the university to its ability to inculcate students with a sense of personal and civic integrity; the inability of the university to have a significant moderating influence on the policies of the laboratories, which are primarily responsible to the Departments of Energy and Defense; and, finally, the complicity of the university in what many regard as an important self-serving role of the laboratories in fueling the arms race with the Soviets. They have argued that on the overall scale of the university (with a 1986 budget of 4.2 billion dollars), the previously listed advantages to UC are not very significant and that many could be perserved without UC's management role.

Until the late 1960s renewals of UC's management contract took place in a routine fashion. Since that period, marked by the Vietnam War and the

"Berkeley student revolution," there have been significant challenges, led by students and supported by a substantial minority of faculty and University Regents, to terminate the relationship, which, however, have failed.

At the present time student organizations are again calling for the university's disengagement—a student protest took place on several campuses on November 24, 1986; and a group of over forty physics faculty members, mostly very senior, are challenging the UC administration to demonstrate whether it is able to prevent arms-racing initiatives by the laboratories. Also, for the first time, the state-wide UC faculty has very recently created an Academic Senate committee charged with an ongoing assessment of the university's relationship with the laboratories.

The UC Institute on Global Conflict and Cooperation (IGCC). In 1981, when a majority of the university's Regents was about to support another five-year renewal of UC's management contract for the weapons laboratories, a proposal was put forward by Governor Edmund G. Brown, Jr., (an ex officio regent), who was opposed to renewal, and by the president of the university that a faculty committee be appointed with the following charge: to explore the establishment of a state-wide university organization devoted to teaching and research in the area of prevention of nuclear and other global conflicts. A duly prepared report of a committee chaired by Professor Ernst Haas was accepted by the Regents and the UC "Institute on Global Conflict and Cooperation" (IGCC) was created and formally approved in 1983. Many have seen in this act an attempt by some Regents to counteract a possible image of the board as taking a hawkish position in the national debate about the arms race.

The institute has now been in operation for about four years and has had a major impact on research and teaching dealing with nuclear and related issues. The institute is a multicampus organization with headquarters at UC San Diego. Its director is a physicist, Professor Herbert York, who has a distinguished earlier record as director of the Livermore Laboratory, director of defense research and engineering for the Pentagon, member of the President's Science Advisory Committee, chancellor of the UC San Diego campus, member of the General Advisory Committee of the U.S. Arms Control and Disarmament Agency, and U.S. ambassador to the Comprehensive Test Ban Talks. He is the author of a number of articles and books dealing with the arms race and arms control, such as *Race to Oblivion*.¹⁷ He is supported by two part-time associate directors, an additional staff of three persons, and student help.

The institute operates on a public budget of approximately \$1.2 million/year derived from the university¹⁸ (\$600,000) and the state legislature (\$600,000). These funds are disbursed in the following main categories:

1. Statewide activities (\$300,000): Steering committee meetings; publications; visiting professors; Education Abroad seminars in Dubrovnik

up which periodically links classrooms at Tufts and the Soviet counterpart university.

We have no solid basis for reliably estimating the fraction of college students, nationwide, who have at least some academic exposure to the nuclear dilemma. But based on our knowledge of the University of California and of a few dozen other institutions, we estimate approximately ten percent (to within about a factor of two), a very low number. Obviously much remains to be done by both public and private institutions. In the meantime good statistical research would be very valuable to define the problem more completely. The United States Institute of Peace (see below) appears to be a very appropriate organization to sponsor such research.

Unfortunately a reliably comprehensive overview of all U.S. university-level activities related to the nuclear predicament is also not available. *Peace and World Order Studies*²⁷ provides an *incomplete* list of thirty-one case studies of institutions having coherent curricula (majors, minors, course clusters). It is interesting to note that of these, twelve are public institutions and nineteen private; of the latter, thirteen are religiously oriented and six are secular. Most of the thirty-one institutions listed are relatively small (less than 5000 students).

C. Canada

Ever since World War II, Canada has been exceptionally active on behalf of world peace. We recall here the prominent role played by Lester Pearson in the establishment of the United Nations and the resolution of the 1956 Arab-Israeli war. In 1957 he was awarded the Nobel Peace Prize. Later he authored *Diplomacy in the Nuclear Age*. Also on numerous occasions Canadians have served in United Nations peacekeeping forces.

In keeping with this tradition, the House of Commons in 1984 unanimously established the Canadian Institute for International Peace and Security, as a publicly funded but exceptionally independent organization. Board members are appointed by the government from nominations by a wide range of non-governmental organizations, after consultation with the leaders of all recognized parties in parliament. The present board is highly representative (higher education, clergy, labor, industry, world peace-oriented organizations, journalism, retired military, a former U.N. ambassador, a former ambassador to the U.S.S.R., etc.) and includes a distinguished American (Paul Warnke) and German (Christoph Bertram, of *Die Zeit*). The executive director is G. H. Pearson, former ambassador to the U.S.S.R. The institute has three functions: research, both in-house and extra-mural; dissemination of information and encouragement of public discussion; establishment of a library and data center. Its budget, after start-up, is five million Canadian dollars (about 3.5 million U.S. dollars). The institute has already published several excellent articles on subjects like "Star Wars and Norad" and "Guatemala 1986," a useful international bibliography of peace literature, background papers and working papers

*Weapons*²⁴ and *Hawks, Doves and Owls: An Agenda for Avoiding Nuclear War*.²⁵ The center also publishes a quarterly journal, *International Security*.²⁶ CSIA members teach a Harvard College-Kennedy School course entitled "The Nuclear Age," as well as other courses in international affairs, national security, and science policy. In conjunction with the Center for International Studies at MIT it offers a two-week summer workshop on nuclear weapons and arms control issues for university educators, which is in many ways similar to the summer seminar conducted by IGCC in California. Finally, the center sponsors numerous seminars and conferences.

Massachusetts Institute of Technology, a private, mostly science and technology oriented institution, has a student body of 9,500. Its Defense and Arms Control Studies Program is a graduate teaching and research program, with some courses also open to MIT undergraduates. Courses emphasize the technical aspects of U.S. and Soviet arms control and defense policies and weapons technology.

Research projects deal with a variety of defense-related topics, including arms control, naval nuclear weapons, nuclear non-proliferation, nuclear winter, public opinion and arms control, Soviet military policy, and ballistic missile defense.

The program and the Center for International Studies cosponsor with Harvard the two-week summer workshop mentioned above. It hosts conferences and regular seminars. Faculty and staff frequently testify before Congress and are in demand as speakers by various groups. The faculty of nine is headed by Professor Jack Ruina, Electrical Engineering, and includes six members of the Political Science Department. It is complemented by a research staff of nine resident and visiting scholars.

At Tufts University, the Nuclear Age History and Humanities Center (NAHHC) has been in operation since the fall of 1986, under the direction of historian Martin Sherwin. Its purpose is to bring the perspectives of the humanities and the humanistic social sciences to bear on the nuclear arms race and its consequences, supplementing the work of more technically oriented scholars working in the field. Training scholars who incorporate that broader range of perspectives is a major objective. The center's fellows program includes support for graduate and undergraduate associates as well as junior and senior scholars.

In addition to research and archival activities, NAHHC sponsors public lectures and seminars for area and visiting scholars, holds an international conference abroad for university heads and opinion leaders, conducts short public outreach courses at Tufts for other groups, plans a publications program, and will participate with Harvard University Press in issuing a Nuclear Age History book series, including both new research and reprints of important works in the field. A recent innovation is a team-taught, joint U.S.A.-U.S.S.R. television course on the history of the arms race, utilizing a live satellite hook-

and Tokyo or Hong Kong for UC students studying, respectively, in Europe and Asia; summer institutes for high-school teachers; conferences for IGCC grantees and fellows; disciplinary conferences; etc.

2. Central office (\$230,000): Salaries and benefits (\$170,000), miscellaneous.
3. Minigrants (\$600,000): Dissertation fellows (\$150,000); campus programs (\$180,000); individual grants for research, teaching, conferences (\$250,000); miscellaneous. With very rare exceptions, budgetary support is limited to less than \$15,000 per project. Recent examples are:
 - a. Teaching: "Quest for Peace"—over one hundred videotaped interviews with prominent national and international personalities, and associated teaching guide; a course called "The Nuclear Predicament," part of a freshman honors program.
 - b. Research: "George Kennan and the Dilemmas of U.S. Foreign Policy"; "The United States and Nicaragua: Averting War in Central America"; "Urban Flammables Available for Burning in a Nuclear War"; "Morality and Nuclear Deterrence."
 - c. Conferences: "Society, Self and Nuclear Conflict" (supported also by the UC San Francisco Department of Psychiatry); "Perspectives on the Crisis on UNESCO."

Private grant funds averaging \$300,000 per year have supported summer teaching seminars for college-level educators in California and in Europe, student fellowships, and special research projects.

These examples indicate the wide variety of activities stimulated and/or sponsored by the institute.

There is no question that the institute has made a major difference to the level of research, teaching, and general interest and literacy in the area of global conflict and cooperation of the campus communities. Since many activities sponsored by it are also available to the public (regular courses through University Extension, colloquia, luncheon seminars) it has also had considerable impact on the communities surrounding the university's campuses. And yet, in our view, at this time, it has still an insufficient impact on the average student. Let us illustrate this with reference to our own Santa Barbara campus.

UC Santa Barbara

The Santa Barbara campus (UCSB) is a general campus of the University of California, with two professional schools (Education and Engineering), some 15,000 undergraduates, over 2,000 graduate students, and a faculty of about 800.

The campus has typically received IGCC support for between six and eight individual faculty research projects each year, for one dissertation student, and

for one conference. In addition, IGCC and the College of Letters and Science support a formal upper division certificate program, Global Peace and Security (GPS).

Shortly after the establishment of IGCC, two Santa Barbara faculty members prepared a proposal for this GPS Program, which is open to all campus majors. A highly interdisciplinary faculty group representing twelve departments, ranging from religion to physics,¹⁹ was convened and elected Professor Wolfram Hanrieder, an expert in international relations, as its chairman. A tentative program was put together.

The enthusiastic support of the dean of the College of Letters and Science was obtained, who tentatively committed \$15,000 to the program. The faculty Executive Committee of the College was very cautious in its review and added to the course and colloquium requirements of the program a special research paper. Since this campus does not have formal minor (or equivalent) programs, GPS became a certificate program, i.e., students completing the program satisfactorily receive a certificate from the dean attesting to this fact. Much to the distress of the GPS faculty, however, the executive committee and the administration refused to have completion of the program entered on the students' official record! (It would set a precedent . . .) The program was then approved in modified form in 1984 on a three-year experimental basis. Additional funding in the amount of \$6,000 from each source was obtained for the first year from IGCC and from a local foundation.

The present requirements of the program are as follows:

1. A set of three regular courses, at least two from a primary list of fifteen, and one from the total list (primary or secondary) of thirty-eight.
2. Enrollment in a special two-quarter seminar taught by several faculty members. A short research paper is part of this course.
3. Attendance at and brief commentary on at least seven out of ten colloquia given by distinguished speakers. (The series of 1984-85 colloquia was published as a book.)²⁰ The number of students completing the entire program has been small, though growing: nine in 1985, fifteen in 1986, and thirty-two in 1987.

We believe that among the administrative difficulties of the program are the following: its requirements are *additional* to students' regular graduation and major requirements; participating faculty (except for the chairperson) do not obtain released time or academic credit for their participation, which constitutes largely unrecognized additional effort; finally, the fact that completion of the program is not shown on the students' official transcript sends a "low value" message to them.

Among the academic weaknesses are the following: The special two-quarter GPS sequence has not been entirely successful. The difficulties appear to be the intrinsic problem of an upper division course that tries at the same time to be substantive and broadly interdisciplinary, as well as the inadequate faculty

Among the program's members are some of the most influential independent experts on nuclear war, including Professors H. Bethe (emeritus), F. Long (emeritus), K. Gottfried, N. Lebow, C. Sagan, and R. Garwin (professor at large). The program takes pride in its strongly interdisciplinary composition, including about thirty faculty members from physics, chemistry, government, economics, sociology, etc.

The program sponsors faculty and graduate student research (approximately ten students, mostly in government), a regular Technical Arms Control Seminar, and a series of weekly general peace studies seminars.

A highly popular undergraduate introductory course, "War and Peace in the Nuclear Age" (cross listed between government and physics), has attracted approximately 400 students. The program does not offer a formal undergraduate major or minor, but it offers several other courses in the peace area such as "Arms Control and Defense Policy," "The Politics of Defense Spending," "Sociology of War and Peace," and "Ecological Consequences of Nuclear War."

Stanford, a private university with a total student body of 13,000 (divided equally between undergraduates and graduates), has had a Center for International Security and Arms Control for fifteen years. This center is generally regarded as one of the most successful in the country. It is co-directed by Professors J. W. Lewis (political science) and S. D. Drell (physics).

The center sponsors a basic multidisciplinary course, "Arms Control and Disarmament," with a core staff of four faculty and about ten to fifteen guest professors. Enrollment is of the order of 150-200. The student newspaper describes it as one of a dozen "all-time favorite classes . . . comprehensive, thought-provoking and difficult."

In addition, the center sponsors about ten research projects on political and technical subjects, it supports a Science Fellow program for three mid-career scientists annually, it organizes weekly technical seminars for some twenty-five scientists from the Bay area, it sponsors a number of "general interest" seminars, and it hosts fifteen to twenty visiting fellows for part or all of the year.

Harvard University, a private university with a student body of 17,000, has traditionally led the country in influential educational innovations. In the area of avoidance of nuclear war it is sponsoring a number of important projects which have had a major impact on national policy and on nuclear age education.

The Center for Science and International Affairs (CSIA) was established in 1973 in the Faculty of Arts and Sciences and since 1978 has been part of the John F. Kennedy School of Government. Each year a multi-national group of about twenty-five scholars is in residence, in addition to about twelve Harvard faculty members and twenty-five adjunct research fellows from the Greater Boston area who participate in the center's work. CSIA includes the Project for Avoiding Nuclear War, and other related activities. It has been responsible for the publication of a number of important books, notably *Living with Nuclear*

nerability" and "Nuclear Terrorism," are being conducted; and public lectures and films are being presented.

B. Other American Universities

A comprehensive survey of all U.S. universities will not be attempted here. We shall, however, describe a few significant and representative programs and then give our sense of the overall picture.

The University of Wisconsin is a large multicampus system with 162,000 students, in many ways similar to the University of California. Organized activity in nuclear war education and research is centered in its largest campus at Madison. Since 1985 this campus has had a program on International Cooperation and Security Studies (ICSS). Its initial emphasis is on faculty development by means of a three-year series of public lectures by distinguished scholars and active practitioners, with associated seminars for faculty and graduate students. ICSS is also beginning to collect research materials for the establishment of a dedicated reading room. It sponsors a bi-annual publication titled "Perspectives on War and Peace."

Since 1982-83, the campus has offered a highly interdisciplinary course called "Perspectives on Nuclear War," coordinated by one faculty member, Professor R. Ringler, of English and Scandinavian Studies, and featuring lectures by some thirty speakers, faculty, and non-faculty experts. Enrollment is about 200, representing some forty different majors and graduate programs. Public participation is invited and is sometimes as high as 150. The original 1982 course was carried by Wisconsin Public Radio.

Wisconsin has also recently (1985) established a consortium of twenty-two public and private universities and colleges, the Wisconsin Institute for the Study of War, Peace and Global Cooperation. This institute bears resemblance to the University of California Institute on Global Conflict and Cooperation (IGCC). It differs from it in formally including institutions which are not part of the State University system.²² The Wisconsin institute, only about two years old, is not yet as completely developed and funded as the IGCC of UC.

Cornell is a private university with 19,000 students. Its peace-related activities began in 1970, growing out of its Program on Science, Technology and Society. In 1974, along with Harvard, Stanford, MIT and Columbia, Cornell received an initial 0.5 million-dollar grant from the Ford Foundation to support programs in arms control and international security. It has been one of the leading institutions in this area ever since.

Today, Cornell offers a Peace Studies Program, a component of the Center for International Relations. It is directed by Professor R. N. Lebow, whose background includes on-site experience in the recent wars of Vietnam, Ethiopia, and Algeria, as well as work for the CIA and teaching at the National War College. His book, *Between War and Peace*,²³ explores the nature of international crisis.

recognition mentioned earlier. It may also well be that the secondary course list is too narrow and should be broadened to include all upper division courses dealing with non-Western languages and cultures.²¹

One postscript may be of interest. After the initial formation of the university-wide IGCC, the liaison faculty member for Santa Barbara requested the opportunity to make a brief report to the campus faculty committee charged with educational policy. This request was denied, twice, on the grounds that the committee dealt only with items for specific action. Apparently this committee did not feel that this new university-wide initiative was educationally sufficiently significant to warrant a minor exception to their routine. Fortunately, other campus leaders and committees showed much greater interest, which enabled the GPS program to be established at Santa Barbara.

Some rough estimates of the involvement of faculty and students in courses, research, and colloquia in the area of global conflict and cooperation on our campus may be instructive. Of course, there is considerable arbitrariness how this area is defined and we shall explain our definitions in each case.

• *Undergraduate student involvement in relevant courses.* We define the "relevant" courses as those thirty-eight courses listed in the GPS Program. We shall use an average relevancy factor of 0.75 to allow approximately for the fact that many of these courses also contain some material of no or marginal relevance.

The total student enrollment in these courses in 1985-86 was 3,177. Taking into account the total number of undergraduate students (14,950) and the four years "normal" time for graduation yields the result that, on the average, a student takes 0.85 GPS relevant courses in his career. (When the relevancy factor of 0.75 is applied to this number one obtains an effective average of 0.64).

We have polled 131 upper-division students enrolled in three representative relevant courses to ascertain how many of the thirty-eight relevant courses they will have taken before graduation. From this poll we derived the following results. Among students taking at least one relevant course, 27.5 percent take a total of one course; 24.4 percent two courses; 14.5 percent three courses; 33.6 percent four or more courses (an average of 5.6). The average number of courses for these students is 3.1.

When these figures are combined with the total enrollment figures we arrive at the results shown in Table 1.

Table 1. Number of "Relevant" Upper Division Courses Taken by Undergraduate Students During Four Years at UCSB

Number of Courses	0	1	2	3	4 or more (average 5.6)
Percentage of Students	72.5	7.6	6.7	4.0	9.2

We have also treated the input numbers in various other ways (seniors only, different weights for different courses) to check the robustness of the numbers in Table 1. The results differed by 10 percent or less. We, therefore, have confidence that Table 1 represents a correct picture. (We recall again that a relevancy factor of about 0.75 should be applied to the number of courses.)

Finally we want to mention one encouraging fact: In 1983 the new general education requirements for the Bachelor of Arts degree reintroduced proficiency in a foreign language and included a course dealing with a non-Western culture. We consider these to be valuable steps to prepare students for more global perceptions. Extension of these requirements to other undergraduate degrees, such as Bachelor of Science, should be sought.

- *Undergraduate student involvement in colloquia.* Here we count the colloquia sponsored by the GPS Program (open to the entire campus community), as well as occasional, large, cosponsored events (the Dalai Lama, Bishop Tutu, etc.). Rough attendance estimates yield the result that over a period of four years students attend on the average 1.0 such colloquium. However we also estimate that only about 20 percent of all students attend one or more such colloquia, and about 80 percent none.

- *Faculty involvement.* We consider a faculty member "involved" if he either teaches a relevant course, is on the GPS advisory faculty, or conducts IGCC-sponsored research or conferences. Of course many faculty members are involved in several of these activities. In this sense we find fifty-two faculty members, or 6.5 percent, involved.

- *Involvement of graduate students.* UC Santa Barbara does not have any formal graduate program analogous to the GPS undergraduate program. However, of a total graduate student body of 2,050, there are approximately five to seven students working on Ph.D. dissertations on related subjects, and approximately twenty enrolled in one or more graduate seminars, mostly in the area of International Relations (Political Science).

Are these figures encouraging or disappointing? And how much difference have the organized efforts of IGCC and GPS made? We are convinced that, thanks to these latter efforts, involvement of students and faculty has been greatly enhanced.

The fact that an estimated 9.2 percent of undergraduates take four or more (typically 5.6) relevant courses and will therefore presumably be fairly well informed, is, in our opinion, a significant achievement. On the other hand we find it unacceptable that an estimated 72.5 percent have no academic exposure at all to the nuclear predicament and related issues. On this campus, current activities involving undergraduates need, in our view, to be approximately doubled or tripled. For graduate students and faculty as well a realistic goal appears to be an approximate doubling or tripling in involvement.

The educational objective should be twofold: *all* students should leave the university at least minimally literate in the issues of the nuclear predicament and

a significant fraction (ten percent or more) should be so well informed that, in a few years' time, there will be a substantial number of political and civic leaders, and of teachers and role-models, to redirect the efforts of this country away from nuclearization and towards constructive efforts to deal with global problems.

Other UC Campuses

Because of their different traditions and high degree of independence, the various UC campuses pursue activities related to the nuclear predicament in diverse ways. Many of these activities are supported by the IGCC.

UC Berkeley, one of the two large campuses, has had since 1955 a distinguished Institute of International Studies, as well as a new experimental major, Peace and Conflict Studies. A Directory of Peace Scholars lists sixty-eight faculty as involved with peace-related university activities. The campus recently received a large grant from the MacArthur Foundation.

UCLA, the other large campus, has a major Center for International and Strategic Affairs. In addition to regular courses like "Peace and War" and "Political Issues in the Proliferation of Nuclear Weapons," UCLA recently offered, in conjunction with UCLA Extension, a course entitled "The Search for Security in a Nuclear Age." UCLA is the home for IGCC's statewide media library.

UC Davis has for several years offered a successful lower division course on the politics and technology of the arms race and arms control; it conducts a summer program for high school teachers; it sponsors a regular series of seminars; and currently it is in the process of implementing a "war and peace" minor.

UC Irvine offers an interdisciplinary Concentration in Global Peace and Conflict Studies. Notable courses are "Social Ecology of Peace" and "The Physics of Nuclear Weapons and Their Control." An endowed chair in this area has been funded.

UC San Francisco, the health sciences campus of the university, has been offering a regular course entitled "The Health Professional and Nuclear War," as well as a continuing education course, staffed mostly by psychiatrists, called "Society, Self and Nuclear Conflict." In the spring of 1987 it initiated a teaching, research, and discussion program entitled "Health Science and Human Survival."

UC San Diego is headquarters for the statewide IGCC. It sponsors a town/gown Faculty Seminar on International Security. Notable course offerings are "History of Arms Control Negotiations" and "START Simulation," a ten-week simulation of the US-Soviet Strategic Arms Reduction Talks (START).

The Adlai E. Stevenson College at UC Santa Cruz sponsors the Stevenson Program on Nuclear Policy. Under its auspices three new courses have been developed; a number of faculty-student research projects, e.g., "C³I Vul-