

Critical Thinking

Reading and Writing

Across the Curriculum

Anne Bradstreet Grinols

Acknowledgments

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This text is dedicated to Daniel, my youngest student.

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Exercise

The situation: You are a tax-paying citizen of Midland, Illinois. Your house is one of 30 houses on Lake Lovely, just inside the town limits. Five years ago, a zoning variance was granted to allow a toothpick factory to be erected just upstream from the lake. Now, the lake is no longer clear, and the marine life is dying.

Your response: You are going to write letters to several people. For each individual listed below, describe the *tone* of your letter. Then, choose one individual and write the letter to him or her:

The mayor of Midland

The president of the neighborhood association

The owner of the factory

The state representative of the district

Your best friend, who lives in Chicago

Your 10-year-old nephew, who will no longer be able to go fishing with you there

Two Unfortunate Trends

Iwould like to express in some detail my ideas on two issues: science education and our scientific relationships with the Soviet bloc.

In a field such as chemistry, 70 percent of the Ph.D. graduates enter industry. Thus, universities train the highly skilled work force that is behind medicine, plastics, photography, synthetic fibers—indeed, every aspect of modern society, everything around you. Universities and industry share a common interest in attracting talented young men and women to the science professions. I'm sorry to say that the great American industry has not done its share in this training process. In a typical good department of chemistry, such as Cornell's, less than 5 percent of our teaching and research support is from industry. Much support is from one or another government source, and a substantial portion comes from the gifts of our generous alumni and from general university funds. There are industrial givers, to be sure, but it is mainly individuals who support us.

Young people are not as attracted to science as they once were. Why? Several reasons come to mind: (1) a growing antirationalist mood in society, manifesting itself through interest in astrology, the occult, and so on; (2) a loss of the perception of science as purely progressive, owing to an emphasis, not necessarily an overemphasis, on the negative side effects

of technological development, such as pollution; (3) meager financial incentives to scientific careers; (4) a deterioration in scientific literacy; and (5) a loss of infectious enthusiasm that was inevitable when the exponential, dynamic increase in numbers of scientists leveled off in the past decade. These are a few reasons, among many, I'm sure you can add more. Yet just when it is agreed that we must work to counter these trends in order to assure the future flow of manpower into science, at the same time there are severe cuts specifically in the funding of science education. It doesn't make sense. This is the time to put resources into increasing the scientific literacy of the public and improving science education. We need to train teachers, rejuvenate textbooks, provide creative science programs similar to "Nova" or "Cosmos" on public television, attract students to research through summer research jobs.

I have been speaking about the universities in terms of their teaching function. Let us not forget that in America (unlike France or the Soviet Union, which have alternative establishments for science research) it is in the universities that basic research, the foundation of most applied research, is accomplished. There is no lack of evidence that the basic research already done in universities is being utilized by industry. For instance, the work of mine that was the basis for the Nobel Prize was shown in a recent study to be the research most cited not in the literature of pure chemistry but in journals of applied chemistry.

There is a synergism between education and research at universities. And when universities in general get in financial trouble, as they are now owing to loss of student aid, this is reflected in a general climate of stringency, of budget cuts, of constriction on those people most directly concerned with both education and research. And in constricting times it is difficult to do great research and to excite young people.

Let me turn to another matter: curtailment of scientific exchanges with the Soviet Union and its allies. I have some unpopular opinions to express here. Before I tell you my thoughts, it's important that you know something of my background. My family and I lived under Soviet occupation from 1939 to 1941 and from 1944 to 1945, surrounding a worse Nazi occupation from 1941 to 1944. I was a child then, but I have learned from my parents how things were. In 1960, in the middle of graduate school, I went to the Soviet Union for a year on an exchange program sponsored by the State Department. I have been in the USSR three times since. I speak Russian and am probably one of the few people in the United States who lectures

in the Soviet Union on his work in Russian. I have an excellent idea, I think, of the workings (or lack thereof) of Soviet society, and of science and technology in particular. In my research group at Cornell there have worked over the years three Rumanians, two Czechs, one Hungarian, one East German, and two young men from the People's Republic of China. My special background gives me a feeling of great sympathy for the people of the Eastern European bloc countries.

In recent years, scientific exchanges between us and the Eastern European countries have been sharply curtailed. The Carter administration, with the support of Congress, cut exchanges because of the Soviet invasion of Afghanistan; the Reagan administration continued this policy because of the tragic situation in Poland. Our National Academy of Sciences curtailed official exchanges and cooperative research because of the treatment of a colleague, Academician Sakharov. There is substantial private and personal pressure on scientists in this country to break all Soviet contacts because of Russian treatment of refuseniks and dissenters. As a result visits and exchanges in both directions have been drastically reduced.

I think this curtailment is a serious mistake. I think that despite the actions by the Soviets and their allies, actions that you and I disapprove of, it is important to maintain contact between scientists of both worlds, and it is we as much as they who are hurt by the present situation.

In the closed society which is the Soviet Union, every small window that is opened on the West lets in the light of the world, making friends for us. Soviet scientists, the Soviet intelligentsia, are that segment of their society that is most receptive and responsive to our ideas. They have an opening to the West, a sense of being with us, through the open scientific literature. That sense of being with us is reinforced by any American's visit there, by any Russian's visit here.

There is no question that every such visit, in either direction, has official sanction from the Russian side and is used by Soviet authorities in their own official way. Yet they cannot block the personal side of a visit from coming through—the very presence of an American scientist talking freely about his beautiful experiment, using instruments his Russian counterparts don't have, showing pictures of his laboratory—that presence by itself makes more friends, convinces more people of what is right here.

I would also argue on grounds of simple self-interest that it is essential for the security of our country that we have people here with firsthand knowledge of the workings of the Soviet system. The exchanges and joint

research programs produce such knowledge. I would urge that we seek the wisdom of people, such as Dr. Armand Hammer, who have shown that it is possible to have meaningful business dealings with the Russians, to our own benefit.

Finally, I think scientists have a responsibility, based on the rational and open tradition of their activities, to keep talking to each other even when the rest of society is disposed to become angry. It is not that we are better people. It's just that we have a base of small talk or shop talk—the facts and excitements of science—by which an angry discourse is turned into polite, friendly conversation. The psychology of communication between people—husband and wife, parent and child, Democrat and Republican, fans of two rival football teams—requires such points of common interest to allow the communicators to bypass anger. It is no different between nations. If we are to achieve a rational and secure plan to end the horrible prospect of nuclear war, we need to keep in touch. Be firm with the Soviets on the level of governmental relations, but let the scientists talk to each other.

Comprehension Questions

Assimilation

- In chemistry, what percentage of the Ph. D. graduates enter industry?
 - 30
 - 50
 - 70
 - 5
- University teaching and research support comes mainly from:
 - alumni and industry
 - government funds and alumni
 - industry and general university funds
 - government funds and industry
- Fewer young people are attracted to science for all the reasons below *except*:
 - little financial incentive
 - deterioration in scientific literacy
 - growing antirationalist mood in society
 - poor teaching available at the secondary school level

- Methods cited to increase the scientific literacy of the public include all *except*:
 - improved textbooks
 - addition of more science programs on TV
 - replacement of scientific experimentation with more useful work
 - addition of more summer research jobs

- According to the article, universities are in financial trouble owing to:
 - Ph. D.'s going into industry instead of teaching
 - loss of student aid
 - the recession of the 1980s
 - decreased alumni giving

- Dr. Armand Hammer's contact with the Soviet Union is through:
 - medical research
 - chemistry
 - physics
 - business

Interpretation

- The author's purpose in giving his personal background is mostly to:
 - create sympathy for the people of Eastern bloc countries
 - create sympathy for himself
 - prove he has unusual knowledge of the situation
 - increase the number of internationals in his research group
- The author feels that scientists of opposing nations can and should communicate about:
 - the psychology of communication between people
 - how to keep the peace between their nations
 - scientific topics
 - political and philosophical questions
- The tone of the article is intended to be:
 - neutral
 - humorous
 - persuasive
 - cynical