The New Liberal Arts Program

Alfred P. Sloan Foundation, 1980-1992

A retrospective review of the "New Liberal Arts Program" of the Alfred P. Sloan Foundation drawn from a variety of internal summative reports. These notes do not represent a complete summary of the program, but merely a selection of ideas relevant to quantitative literacy. (QL Home Page)

In the late 1970s, as American public attention was focused on rising inflation, oil embargoes, and the Iran hostage situation, entrepreneurial pioneers on the West Coast of the United States invented personal computing. Between 1977 and 1979, Steven Jobs created the Apple computer; Bill Gates and Paul Allen founded Microsoft; Bop Metcalfe invented Ethernet; Hayes marketed the first modem; Epson created an affordable dot- matrix printer; Intel introduced the 8088 chip, a 16-bit processor; Dan Bricklin and Bob Frankston introduced the spreadsheet Visicalc; and WordStar, the first word processor and the database program dBase were created. In 1980 Ronald Reagan becomes president, Steve Ballmer joins Microsoft; IBM creates a crash program to develop a personal computer; and Microsoft agrees to provide the operating system. Few then realized how the world had changed.

One of those who had a glimmer of the revolution to come was Stephen White, vice-president of the Alfred P. Sloan Foundation. In 1980, White argued in an internal memorandum entitled "The New Liberal Arts" that in the late twentieth century the tools of technology--computing, quantitative reasoning, applied mathematics--deserve a central place in liberal education. White argued that just as a century earlier science claimed a central place in the undergraduate curriculum, so at the dawn of the twenty-first century these "new liberal arts" deserve a similar role--not as separate courses or departments, but as a commitment to quantification and technology infused throughout the arts and humanities. Not only are these studies essential for the nation's economic vitality, but they provide perspectives that responsible citizens must have.

A year later White's memorandum together with several brief responses from educators was published and widely distributed by the Sloan Foundation, especially to faculty and administrators at selective liberal arts colleges whom the Foundation viewed as the natural leaders in liberal education. During the ten year period 1982-92 Sloan awarded 23 liberal arts colleges nearly $20 million to advance quantitative reasoning and technological literacy in their curricula. A parallel program for historically black colleges was supported with $2 million in grants. Collateral summer workshops, faculty seminars, and a monthly newsletter (NLA News) helped spread NLA-inspired curricular innovation beyond the originally funded campuses.

White's argument rested on three distinct foundations. First, technology itself is increasingly influential in all aspects of life, so technological literacy deserves as much attention as other components of the core curriculum. Second, data analysis and quantitative methods-- aided by computer tools--has positioned applied mathematics as an important tool in many humanities and social sciences. Finally, White worried that college campuses had largely ignored C. P. Snow's two-cultures challenge, devising curricular requirements that enable far too many students to escape serious encounter with the world of quantification.

Much of the Sloan program was focused on development and implementation of curriculum in the special context of liberal arts colleges. Core requirements in mathematics and quantitative reasoning on the funded campuses varied from none to modest; faculty reaction was equally varied, ranging from apathetic to enthusiastic. Strategies were equally varied, from new courses to revisions of existing courses, from short modules to year-long programs. A sample of titles of courses and modules reveal the scope of curricular innovation inspired by the NLA Program:

-- *Expert Systems.* (Trinity)
-- *Episodes in American Invention.* (Princeton and Bryn Mawr)
-- *The Economics of Technology.* (Montana State)
-- *Hyperacoustics: Digital Sound.* (Middlebury)
-- *Pacing the Heart.* (Carleton)
-- *Vaccines: An Introduction to Risk.* (Claremont)
-- *Garbarge and Trash.* (Stony Brook)
-- *Witchcraft: History and Statistics.* (Mount Holyoke)
-- *Chemistry and Crime.* (Williams College)
-- *Bioengineering and Health Technology.* (Davidson College)
-- *Phonetics and Phonology.* (Swarthmore)
-- *Management of Public Risk.* (Brandeis)

Several books based on NLA courses were published jointly by McGraw Hill and MIT Press. These include:

- *Medical Technology and Society.* Joseph D. Bronzino, Mourice L. Wade, and Vincent H. Smith.
- *Understanding Quantitative History.* Loren Haskins and Kirk Jeffrey.
- *Light, Wind, and Structure: The Technology of Historic Architecture.* Robert Mark.
- *The Age of Electronic Messages.* John G. Truxal.
- *Personal Mathematics and Computing: Tools for the Liberal Arts.* Frank Wattenberg.
- *Nuclear Choices. A Citizens Guide to Nuclear Technology.* Richard Wolfson.
- *Discover, Innovation, and Risk: Case Studies in Science and Technology.* Newton H. Copp and Andrew W. Zanella.
- *Architectural Technology up to the Scientific Revolution.* Robert Mark (Editor).
- *Reproductive Technology.* Lawrence J. Kaplan and Rosemarie Tong.

In 1993 the Sloan Foundation commissioned Ames Oakes, physicist and former college president, to review the decade-long New Liberal Arts Program. His conclusions include the following:

- Four out of five students in NLA-supported colleges take at least one course that requires quantitative reasoning, but only two out of five take courses that enhance their technological literacy.

- Approximately one in four faculty became involved in NLA project work on the most active third of NLA campuses. Faculty engagement on the majority of campuses was much lower.

- Success on selected campuses is due primarily to a small number of resourceful faculty backed by solid administrative support.

- Faculty seminars enabled colleagueship across disciplines and created a "culture of conversation" that had heretofore been absent, even in the liberal arts colleges.

- Since the NLA program coincided with the arrival of the personal computer, the program brought about a far more thoughtful, creative, and extensive integration of computing into the curriculum than might otherwise have occurred.

- Offerings of NLA courses have declined since the peak of Sloan funding activity due to increased pressures on institutional budgets and greater emphasis on traditional scholarship.

According to evaluator Ames, one of the most innovative outcomes of the New Liberal Arts program was a series of courses at different colleges, led by Claremont, in which a team of students worked as consultants for an external (usually off-campus) client. These programs, often called "clinics," required students to research a real problem facing the client, plan and execute whatever is required for analysis and recommendations, and present a final report in a form suitable for professional use by the client. They greatly enrich students' educational experiences and link colleges more closely with their surrounding communities. Examples of clinic projects:

Indirect Costs. To develop a plan to allow the city of San Bernardino to document the full costs of providing central services to various funds (enterprise, internal service, special revenue, capital projects, and user fee) in order to help the city make realistic decisions about fees and future budgets.

Ethnic Population. Analysis of chronic diseases among ethnic communities in California in order to educate at-risk groups and provide better health care to unique communities.

Hunger Project. To develop guidelines for community-based hunger projects based on an analysis of options for reducing the cost of food and supplies delivered to economically disadvantaged people in a region of Los Angeles.

Issues and Observations

Technology and Numeracy. The NLA program addressed twin goals of technological and quantitative literacy, both of which are of increasing importance in modern society. While different, these goals are intimately related. Computing has both enabled and compelled mathematical and statistical methods across the liberal arts and sciences by making possible analysis of realistic data. Reciprocally, in this age applied mathematics is practiced primarily on the computer. Both relative newcomers to liberal education, computing and applied mathematics appear to fit like hand and glove.

Yet on the NLA campuses the reactions to increased technology and numeracy have often diverged. In contrast to mathematics which has been part of liberal education since ancient times, computing (at least in 1980) typically lived in colleges of engineering which, with few exceptions, are absent from liberal arts colleges. Thus the case for technology as a discipline appropriate for liberal education is harder to make than for applied mathematics. Even after a decade of subsidy from the Sloan foundation, courses dealing with technological literacy have made only modest gains at selective liberal arts colleges.

Modes of Thought. Advocates for the New Liberal Arts hoped that leading liberal arts institutions would embrace not only the computer but also the modes of thought--principally quantitative reasoning--that computing employs. By integrating computing effectively into courses across the curriculum, advocates hoped that student would learn "to reason effectively with numerical information." In his memorandum on

NLA, White argued that courses in applied mathematics must be seen to lie "at the heart of the curriculum." Evaluator Ames reports that on the NLA campuses applied mathematics "is a liberal art," although not yet one that lies at the heart of the curriculum. Faculty at these institutions are generally quite aware of the power of computers to help students develop quantitative intuition. "Numeracy in liberal education," the title of Spelman's program, is a suitable theme for all the NLA projects.

Pedagogy. Reports from NLA courses--as from virtually all courses that make thoughtful use of computers--indicate a natural shift in both teaching and learning styles. Faculty lecture less; students learn more. Access to data and to tools capable of analyzing that data open up enormous opportunities for independent student work. (Similar themes emerged in the movement to reform calculus and K-12 mathematics that blossomed just as the NLA program was winding down.) Collaborative learning, both in class, out of class, and now via e-mail, has thrived as well. On many campuses, the nudge of the NLA argument helped pioneer what has now become a commonplace recommendation.

Evidence. Most undergraduates have access to social science data not only unheard of but undreamed of by Ph.D. student just one generation earlier. The discipline of statistics has been totally transformed by the power of computers to manipulate data. Evidence from real data can now be used as the basis for analysis and inference, supplanting the prior tradition of theorizing based on general principles. Nonetheless, tradition prevails: despite innovation of NLA and related programs, the vast majority of students in the United States still study social science as if real data were untouchable.

Enriching Scholarship. Comments by campus leaders of NLA projects reveal consistent enthusiasm for the indirect benefit of the program in helping faculty who hardly knew each other discover common interests. As a consequence of the substantive interdisciplinary interaction inspired by the NLA program, many faculty also found that their scholarly interests were broadened and enriched. Even at liberal arts colleges, the pressures of scholarship outweigh pedagogy, so curricular innovation can be sustained in the long run only if it arises from a vigorous professional and scholarly interest. Many of those who became involved in the NLA program found that it did have a long-term affect on their professional interests.

Replication. Not surprisingly, most NLA courses still being taught in the early 1990s were being taught by the same faculty who created them eight or ten years earlier. Innovative courses are not easily transportable or transferable. When new faculty are asked to take on these courses, they are more likely to create their own than to pick up the course created by the pioneers. "We can barely get our colleagues to teach the course on our own campus, let alone getting the course taught at other universities."

Students. Most NLA courses are intended for students who have avoided quantitative disciplines and whom mathematicians believe to have less mathematical ability than do those who study mathematics voluntarily. In a 1990 analysis of the NLA experience, faculty at the University of Chicago report that, despite their years of teaching experience, they were surprised to find that this student stereotype is quite inaccurate. Their students eagerly embraced many topics that mathematicians believe to be sophisticated (e.g., systems of differential equations), yet stumbled on others (e.g., number theory, geometry) that to a mathematician require virtually no prior knowledge or experience. They discovered what experienced high school teachers have always known--that many who have difficulty with abstract mathematics, even if simple, can readily learn concrete mathematics, even if subtle.

References

1981. White, Stephen P. *The New Liberal Arts.* Alfred P. Sloan Foundation, 1981.

1984. Koerner, James D. *The New Liberal Arts Program: A Status Report.* New York, NY: Alfred P. Sloan Foundation, 1984.

1990. Goldberg, Samuel, (Editor). *The New liberal Arts Program: A 1990 Report.* New York, NY: Alfred P. Sloan Foundation, 1990.

1992. Truxal, John G. *The New Liberal Arts: Educational Materials.* Stony Brook, NY: State University of New York, Department of Technology and Society., 1992.

1993. Ames, Oakes. *The New Liberal Arts Program: An Evaluation for The Alfred P. Sloan Foundation.* Alfred P. Sloan Foundation, 1993.

QL Home Page
Last Update: 26 June 1999
Contact: Lynn Arthur Steen
URL: http://www.stolaf.edu/other/ql/nla.html