

EDUCATION AND TRAINING AT APL, 1963–1981: LOOKING BACK

This article relates memories of a former staff member who was intimately involved in education and training at APL from the time the APL Education Center began with one degree program until it was a strong, healthy school offering six master's degree programs.

CONTINUING PROFESSIONAL PROGRAMS

When I arrived at APL in September 1963, a few classes were in operation in the basement classrooms of the library, but they were taught by and for APL staff members and no degree programs were available. As I recall, the total enrollment was 50 students in the first term and dropped into the teens in the second term. Interest in the classes was declining rapidly.

Most of the staff members studying under APL's Part-Time Study Program were attending the University of Maryland or other Washington area schools. Most of the classes at those institutions were taught only during normal working hours, so the majority of APL staff members took paid time off to attend them rather than accept repayment of tuition, which was then very low. The absences were costing the Laboratory more than the alternative tuition repayment would have cost if the courses had been taught after hours, and a better solution was sought.

Ralph E. Gibson, then Director of APL, had initiated moves to have courses offered at APL under the aegis of the University's McCoy College (later renamed the Evening College and later still the School of Continuing Studies) so that staff members might work for master's degrees. I had the responsibility of working with Dean Richard Mumma at Homewood to organize and establish the master's program at APL.

In September 1964 classes were first offered at APL that could be used by qualified degree candidates to apply to the Master of Science in Electrical Engineering. The courses were open to all qualified students, not just those from APL. The original plan was that courses would alternate between APL and the Johns Hopkins Homewood campus in Baltimore; it was never envisioned that there would be sufficient interest and attendance at APL so that all courses required for the degree could be offered away from Homewood. It was obvious that the program could succeed only if students were brought in from outside APL. APL's staff numbered between 2000 and 2500, of which only a small fraction were potential students for this new program. If enough other students could be brought in, everyone would benefit by having more course offerings from which to choose.

Our first publication was a thin brochure that listed the courses offered and those we *hoped* to offer if enrollment was sufficient (Fig. 1). We had no good mailing list, so I used the yellow pages of the telephone directory to make a list of every company that had anything resembling science or engineering in its name. Brochures were sent to these companies along with a letter explaining what we hoped to do. Once a supervisor reprimanded me for sending brochures to companies that had not asked for them. My answer was, "I want to put these in every place imaginable where someone can read them, and if they aren't interested perhaps they know someone who will be."

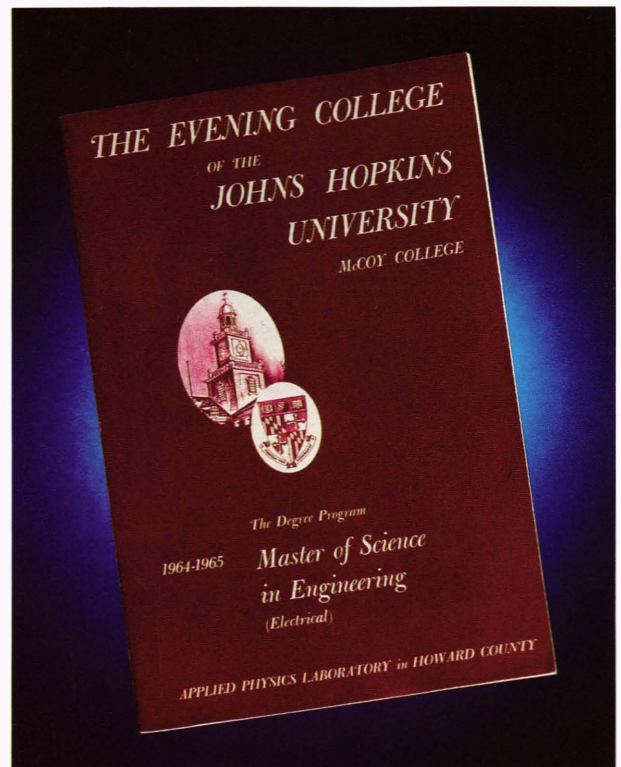


Figure 1—Cover of the first catalog listing the courses offered at APL leading to a Master of Science in Engineering.

This helped get the word out, but the real attractions for our program were the quality and timeliness of courses and instructors. The next term and the next year saw more and more students coming to us because satisfied students were telling their friends about the program. Soon there were so many applications that the course offerings had to be increased.

Interest in courses at the APL Education Center became so intense that the original idea of alternating courses between the Homewood campus and APL was abandoned. In 1966 a second master's degree program, this one in Numerical Science [recently renamed Applied Mathematics], was developed. I can't remember all the members of the committee, but I believe that Robert Rich made the presentation to the Advisory Board, which gave its approval.

With the demand constantly increasing, Dr. Gibson asked me what the next programs should be. I suggested physics and space technology because so many of our students worked in those areas. New APL committees were formed to investigate the feasibility of these programs, and proposals were made that they be instituted. A master's degree program in physics was already offered on campus, and since ours would be taught primarily by APL staff members and have a more applied approach, the committee suggested that we offer a program in applied physics; the other committee recommended a program in space technology. I believe it was Ernest Gray who successfully presented the applied physics proposal, and Richard Kershner put before the Board the case for a space technology program. Word came back to me from one of the Board members that "when Dr. Kershner finished speaking, half the Board wanted to enroll in the program!" Those who remember what a dynamic speaker Kershner was will recognize the truth of that statement.

Both new programs had a noteworthy requirement that a project be completed after completion of the course work. The project was similar to, but not as formal as, a thesis. Students ready to do this work submitted a proposal to me outlining the area they wished to investigate. I would put them in touch with several APL staff members who were both academically qualified and interested in the proposed area of research. When a mutual understanding was reached between the student and one of the prospective advisors, the student was assigned to work with that advisor, who would monitor and grade the work. Robert Fischell taught an especially interesting course in the space technology program and acted as advisor on several projects. Ernest Gray oversaw a number of projects in applied physics. Other staff members also oversaw several projects that came under their areas of expertise.

While this was going on, I was first called Coordinator of the APL Center and later named Director of the Center. My job was similar to that of a project manager, with one glaring exception—I didn't control the money. As almost every APL staff member knows, a project manager usually has no direct control over the people who work on his project. Instead, he contracts to have

various portions of the work done by individual groups whose members report to the group supervisors. About his only means of control (in addition to any "charm and influence" he may possess) is his control of the funds. In my case, all the funds were controlled by the Evening College administration. Consequently, much of my time was devoted to trying to convince them to budget enough monies to provide for expansion of the APL program. We were closing our classes when enrollments reached 40, and almost all of our sections were closed before registration was completed.

Once I became so frustrated that we had to turn away students (because not enough sections would be authorized by the administration of the Evening College) that I wrote words to that effect in a report to the Advisory Board. The Dean caused the offending remarks to be deleted from the report before he distributed it and sent a letter to Alexander Kossiakoff, then Director of APL, and to me complaining of my report. I'll never forget that when Dr. Kossiakoff called me in over this matter, one remark he made was "Paul, I've been trying to make a diplomat out of you and it's *hard!*" The next year, however, money was provided to add more sections at the Center.

I can't say enough about the competence, integrity, and unselfishness of those who taught the courses in our days of crowded classes, classroom shortages, and unparalleled growth. They invariably understood why their classes had to be shifted to unpopular days or times so as to minimize scheduling problems for degree candidates. I can't name all of them, but some of the early instructors were Louis Kelly, Gwynn Swartz, Robert Rich, Robert Fischell, Ernest Gray, Richard Gorozdos, Louis Ehrlich, Edward Cunningham, Stuart Haywood, Ronald Walker, Herbert Fox, and Vincent Sigillito. We also brought in instructors from outside APL, and one who served early and well was Merrill Skolnik from the Naval Research Laboratory. We always used the very best instructors we could find; at various times our faculty included V. David VandeLinde (now Dean of the G. W. C. Whiting School of Engineering), Carl Bostrom (now Director of APL), Alvin G. Schulz (later Associate Director of APL), Alvin R. Eaton (then Assistant Director and later Associate Director of APL), Alexander Kossiakoff (while Director of APL and later as Chief Scientist), Roger Westgate (now Chair of the Electrical and Computer Engineering Department), Owen Phillips of Johns Hopkins, Vincent Pisacane of APL (now head of the Space Department), and others of similar accomplishments.

To this point, excepting the master of science degree in electrical engineering, we had originated all the master's programs offered at the APL Center. Meanwhile, I had studied the scientific and engineering organizations in the Baltimore-Washington area to determine what the educational needs of their personnel were and how many academically qualified persons in their organizations were available to teach graduate-level courses. A variety of useful information was drawn from this study, including two findings very important to the future of the APL

Center: that there existed a great demand for instruction in computer science and an urgent need for a master's program in the management of technical organizations.

Although we fully recognized that the demand for computer science existed, we at APL thought we could not yet offer a program in that area because of the lack of computers, money, and instructors. The Homewood campus had a nucleus of computer science people, however, and they convinced the Evening College administration to institute a program in computer science at APL. We scrambled to provide space and computer time for the program and opened with courses taught by faculty from Homewood, supplemented by academically qualified APL staff members. Remember that at that time very few people in the workplace held doctorates in computer science, so qualified instructors were scarce.

That first year, students greeted the computer science courses enthusiastically, and enrollments were high. The following year, unfortunately, several faculty members left, and others elected not to teach. There we were, offering a program in computer science with many prospective students and few faculty. Despite advice from some to abandon the program, I was able to assemble a highly competent faculty, and thus the program was started. Now this high-quality program is the largest of all the master's programs available at the APL Center.

One of the most valuable tools used to obtain evaluative commentary for the instructors and for my staff was a questionnaire that we developed with the help of the Center's instructors. The questionnaires were sent to the students and returned directly to my office. Each instructor's results were provided to him (and him alone) to use for necessary improvements. The results of all the class responses were summarized and given to every instructor in numerical form as a guide to how he compared with the other instructors. The overall results were also disclosed to the student body, but individual instructor results were not. The purpose of the exercise was to provide information to the instructor so that *he* could judge how well he was operating as an instructor. It has always been my contention that whereas instructors are the ones who should judge *what* should be presented in a course, the students can best determine how well the instructor is presenting the subject. The instructors were enthusiastic about this exercise because it gave them unbiased assessments; they would frequently query my office for the results before we had a chance to compile them.

The newest graduate program that we instituted at the APL Center was the master's degree program in technical management. Alexander Kossiakoff undertook to develop and teach in-house pilot courses and then organized them into a full-scale degree program.

Because APL Center programs were Johns Hopkins programs and therefore had to be of appropriate quality, we tended to use Homewood faculty and APL staff members whenever possible, but we had to turn to outside sources to staff a constantly growing program. My standard advice to any prospective instructor, especial-

ly if he was currently a full-time faculty member of a college or university, was this: "These students are not going to be like your young Ph.D. candidates. They are probably not going to be interested in a specialty. Instead, they want tools with which to do their jobs better. They are different, but that does not mean that they are less smart. They may not appear to you to be as alert as your young students, but remember: they have been working hard all day. Moreover, they will probably subject your statements to more analysis and skepticism than will the young ones. These students have a lot more experience on which to draw."

When we considered an individual to teach one of our courses, we obtained his educational transcripts and inspected them to determine his apparent preparation to teach a graduate-level course. I then interviewed him thoroughly to determine his communication skills and probable empathy with students, and then several APL staff members competent in the subject that he would teach also interviewed him. If he passed our inspection, his credentials were presented for approval to the Academic Council of the Evening College.

In addition to the APL staff members who taught courses, others unselfishly gave us support by assisting in the registrations. Robert Grauel and his staff gave us invaluable technical support by providing monitors that showed the running totals of class registrations so that we could handle large registration crowds. Stephen Smith and his illustrators produced outstanding graphs and charts for inclusion in annual reports of the Center's operations.

I think that it is clear that I regard my association with the APL staff and the students of the Center as one of the highlights of my career. It is doubly gratifying that the programs have continued so successfully.

EDUCATION AND TRAINING AT APL

The APL Center was only one of my responsibilities. I wore two hats—one as Director of the Center, the other as Supervisor of Education and Training for APL. This, too, was a thoroughly satisfying job for me. I was fortunate to be involved with the operation of the Associate Staff Training Program, which recruited promising young graduates with bachelor's and master's degrees to come to work at the Laboratory.

The training program was already in operation when I arrived. George Gendron and others in the College Recruiting Office had hired numerous academically talented young graduates, and Vernon Root and Walter Wright, working under Kossiakoff's instructions, had built a solid training program to orient the new staff members to the work of the Laboratory. It was later, after both Root and Wright went on to other activities, that I was given the responsibility of operating the training program.

Association with these bright young people was a joy; it was a delight to see their sharp minds at work. This is not to say that there were not instances of frustration on both sides. Their first case of frustration occurred

when they realized that, although they had just finished years of grueling academic courses and were ready to go to “work,” they were going to have to take more courses. The next was when we instituted a month-long study of a complex system problem at the end of their course work. After that, they made a presentation of their results to the leaders of the Laboratory (Fig. 2). In most of their academic work, they had been given specifically defined problems and individual responsibility for the solution of those problems. In the system problem, they were given a great deal of data about a real problem facing APL and then told, “Define the problem and solve it.” Two things were new to them: first, they had to define the problem, and second, they had to work *as a team* to solve it. The tools they could use were the knowledge and techniques they had acquired in their academic preparation and those they had learned in the preceding training program courses. Their advisors for this program were APL staff members who had taught courses or whom the trainees had contacted when they interviewed the Laboratory’s technical groups. The problems assigned were not simple ones. One was titled “Evaluation of a Contractor’s Proposal for an Advanced Surface-to-Air Missile.” In simpler terms, that meant “Here is a missile system. Design a better one.” Despite their initial frustration, all the classes eventually rallied and produced excellent solutions and presentations.

The courses in the training program changed yearly as we tried to teach the new graduates about the Labora-

tory’s methods of operation, types of problems encountered, and abilities and facilities to solve the problems. The best description I have seen of the Associate Staff Training Program appeared in an article by Vincent Messer et al.¹ One of my greatest thrills occurred when I read what two of the trainees wrote in that article; Horace Malcom and Pat Herchenroeder showed clearly that they had received from the program exactly what we had hoped they would. I follow the careers of all the trainees with great interest as I read the *Technical Digest*, the *APL News*, and so on; they have made their mark on APL and are now in very responsible positions.

One of the greatest assets in the Education and Training Office was the quality of personnel we had working there. I was fortunate to have James Teesdale as my extremely capable associate and right-hand man. Our clerical force at one time was composed of three young women who were close to the trainees in age and thus able to communicate well with them. They were very efficient and personable, and helped bridge the communication gap between the young people in the training program and the “ancient” ones who ran it.

Because the trainees were not assigned to a technical group when they entered the Associate Staff Training Program, part of the program involved interviewing several groups to determine where they could best work. Later, each trainee would make a confidential list of the groups, ranked in order of preference, to which he or she would like to be assigned. At the same time, each group supervisor submitted descriptions of jobs they had



Figure 2—Engineer Larry Stout and his colleagues in the 1987 Associate Staff Training Program presenting the results of their system problem, A System Concept for Escort-Role Mine Detection.

open and a list of trainees, also in rank order, that they would like to have assigned to them. Many of the trainees were so versatile that group supervisors would sometimes write "any one of these." The requests from the group supervisors would then be matched with the trainees who had stated interest in those groups, and this information was discussed with top management, who made decisions on the basis first of Laboratory need (although no trainees were arbitrarily assigned to groups they did not request). Great effort was made to place trainees in the most suitable groups, where their careers and the group's work would benefit most.

Almost every year, there were many more requests for trainees and good places to put them than there were trainees available, meaning that some group supervisors were inevitably disappointed. Although the placement decisions had been made by management, I was the most visible link in the chain and received most of the blame when a group did not receive a trainee. In one case, a disappointed group supervisor complained bitterly to someone in Personnel, "That S.O.B. Edwards NEVER gives me a trainee!" It happened that I had recommended that a trainee go to him that year, but management had decided otherwise on the basis of overall Laboratory needs. Of course, I couldn't say a word. For a long time, he would pointedly pass me without speaking or scowl as he looked at me. Instances such as this, however, were only minor frustrations in the course of a very enjoyable experience.

One feature I instituted in the training program gave me great satisfaction. Many of the trainees came from inland states and had never seen "blue water" or a large naval vessel. Also, during the Vietnam war years, some trainees came to APL with poorly concealed distrust or dislike of the military. When work was done at APL on naval weapons, it was usually on very advanced weapons designed to protect the United States from threats ten, fifteen, or twenty years hence. If these trainees were going to work in the design or development of weapons used by our Navy, it was important for them to know what the environment was in which our Navy worked *now*. As a result, I managed to schedule, as part of the program, a visit to a large naval base; the trainees were able to go aboard some ships and see what kind of people were manning those ships, to observe what kind of weapons they had and the conditions under which they had to operate, and to see how the particular systems

problem the trainees were working on fit into the Navy environment. It was an eye-opener for many of the trainees. They saw that the young sailors manning the ships were much like themselves, but working under crowded conditions on what appeared to be obsolete equipment compared with what the Laboratory worked on. Several trainees told me that it was an experience they appreciated, and I believe it put things in better perspective for them and prepared them to work on weapons the Navy would use.

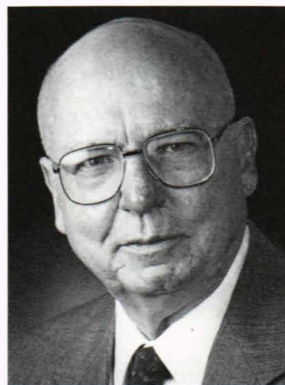
In addition to the Education Center and the Associate Staff Training Program, my other duties involved the Senior Staff Orientation Program, the Part-Time Study Program, the External Short Course Program, senior staff biography control, the APL Scholarship Program, and a few other areas. All in all, I thoroughly enjoyed my 18 years at APL. I can truthfully say now that I miss the people, but not the work, for my days now are still filled to capacity, and I don't think I would have time to work.

I'd like to address my final remark to Alexander Kosciakoff: Kossy, you've had many memorable successes in your life. I think, however, that if you read this article you will admit that you had *one* failure. You *never did* make a diplomat out of me.

REFERENCE

- ¹Messer, V. C., Malcolm, H., Herchenroeder, P. J., Goldfinger, A. D., Garlick, D. S., et al., "The APL Associate Staff Training Program," *Johns Hopkins APL Tech. Dig.* 8, 348-357 (1987).

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