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NEW DIRECTIONS IN VOCATIONAL EDUCATION, CASE STUDIES IN CHANGE.

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IN RECENT EFFORTS OF THE U.S. OFFICE OF EDUCATION TO BRIDGE THE GAP BETWEEN DEVELOPMENT AND ADAPTATION OF EDUCATIONAL PRACTICE, VISIBILITY HAS BEEN GIVEN TO COMMUNITIES WHICH HAVE INTRODUCED NEW CURRICULUMS, TEACHING METHODS, AND INSTITUTIONAL PATTERNS. FIVE LOCALLY-INITIATED PROGRAMS WHICH HAVE ATTEMPTED TO PROVIDE A FLEXIBILITY OF THE EDUCATIONAL SYSTEM TO MEET THE NEEDS OF STUDENTS OF VARIOUS BACKGROUNDS AND ABILITY LEVELS HAVE BEEN SELECTED FOR EXPOSURE ON THE BASIS OF COMMUNITY SIZE, GEOGRAPHICAL REGION, AND PROGRAM TYPE. THE "RICHMOND PRETECHNICAL PROGRAM" NOW OPERATING IN 19 HIGH SCHOOLS IN THE SAN FRANCISCO BAY AREA USES STUDENTS' PRACTICAL AND OCCUPATIONAL INTEREST AS A MEANS OF DEVELOPING GENERAL AND ACADEMIC SKILLS BY UNIFYING PHYSICS, MATH, ENGLISH, AND SHOP COURSES TO ELIMINATE ARTIFICIAL FRAGMENTATION OF SUBJECT MATTER. GEORGIA'S 18 POST-SECONDARY VOCATIONAL SCHOOLS, GEARED TO INDUSTRY DEMANDS, REQUIRED CHANGED ATTITUDES AND NEW ADMINISTRATIVE TECHNIQUES TO GROW FROM A SCHOOL SYSTEM DEVOTED ALMOST ENTIRELY TO TRAINING FOR AGRICULTURAL OCCUPATIONS. THE "MARKET STREET SCHOOL" IN WARREN, OHIO, BROUGHT SIXTH TO NINTH GRADE SLOW LEARNERS TOGETHER IN AN ENTIRELY NEW ENVIRONMENT TO PROVIDE NEEDED GENERAL AND VOCATIONAL SKILLS. PHOENIX, ARIZONA, BUILT INTO ITS EDUCATIONAL STRUCTURE A COMPLETE PARAMEDICAL TRAINING CAPABILITY BY COOPERATIVE EFFORT OF THE PROFESSIONS, HOSPITALS, EDUCATIONAL INSTITUTIONS, AND EDUCATION LEADERS AT STATE AND LOCAL LEVELS. QUINCY, MASSACHUSETTS, IS AN EXAMPLE OF A CITY IN WHICH VOCATIONAL EDUCATION HAS SHIFTED FROM TRAINING FOR A SINGLE SKILL TO PREPARING INDIVIDUALS FOR A CLUSTER OF OCCUPATIONAL SKILLS. THIS DOCUMENT IS AVAILABLE AS FS5.280--80047 FOR 30 CENTS FROM SUPERINTENDENT OF DOCUMENTS, U.S. GOVERNMENT PRINTING OFFICE, WASHINGTON, D.C. 20402. (JM)

new directions in vocational education

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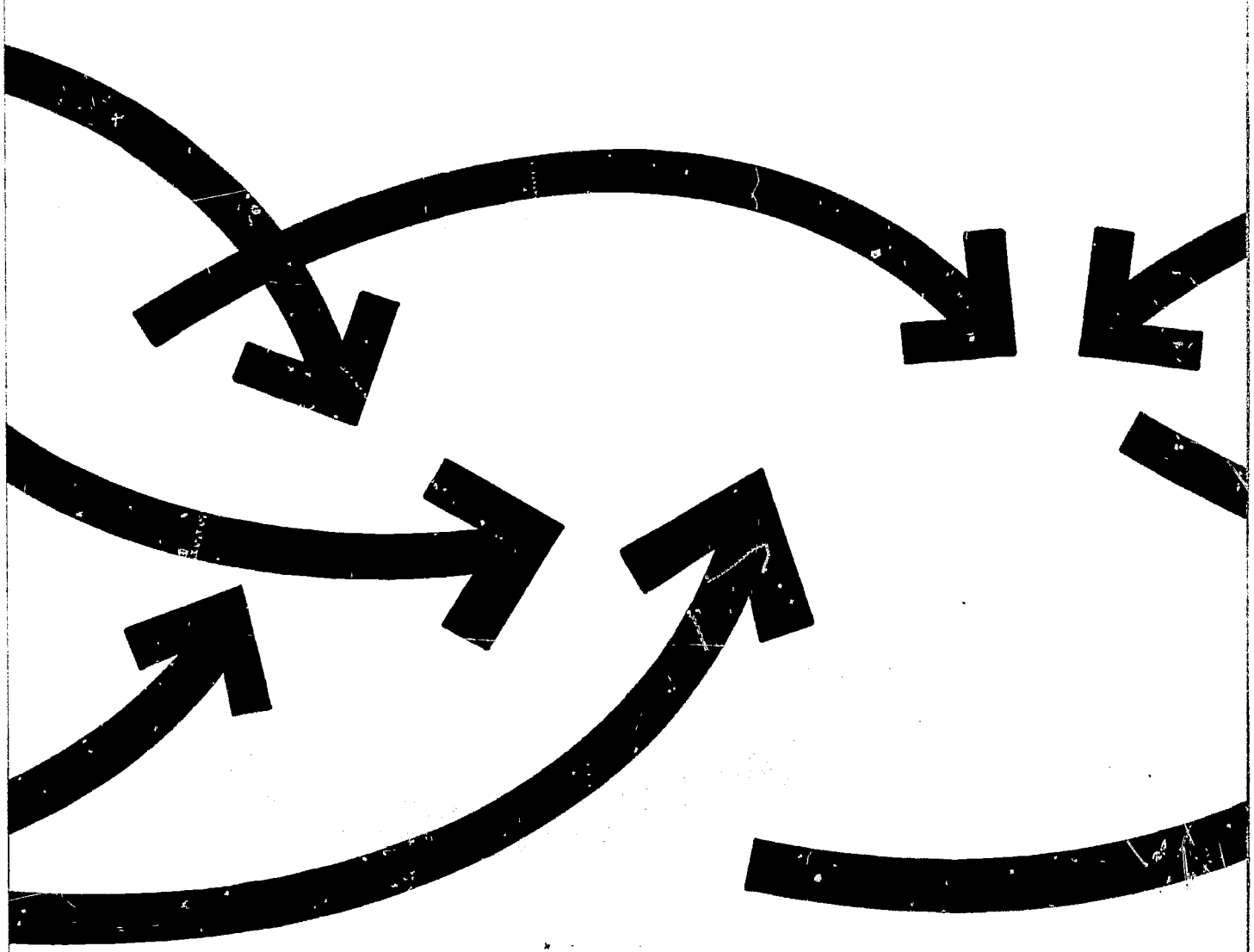

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case studies in change

new directions in vocational education

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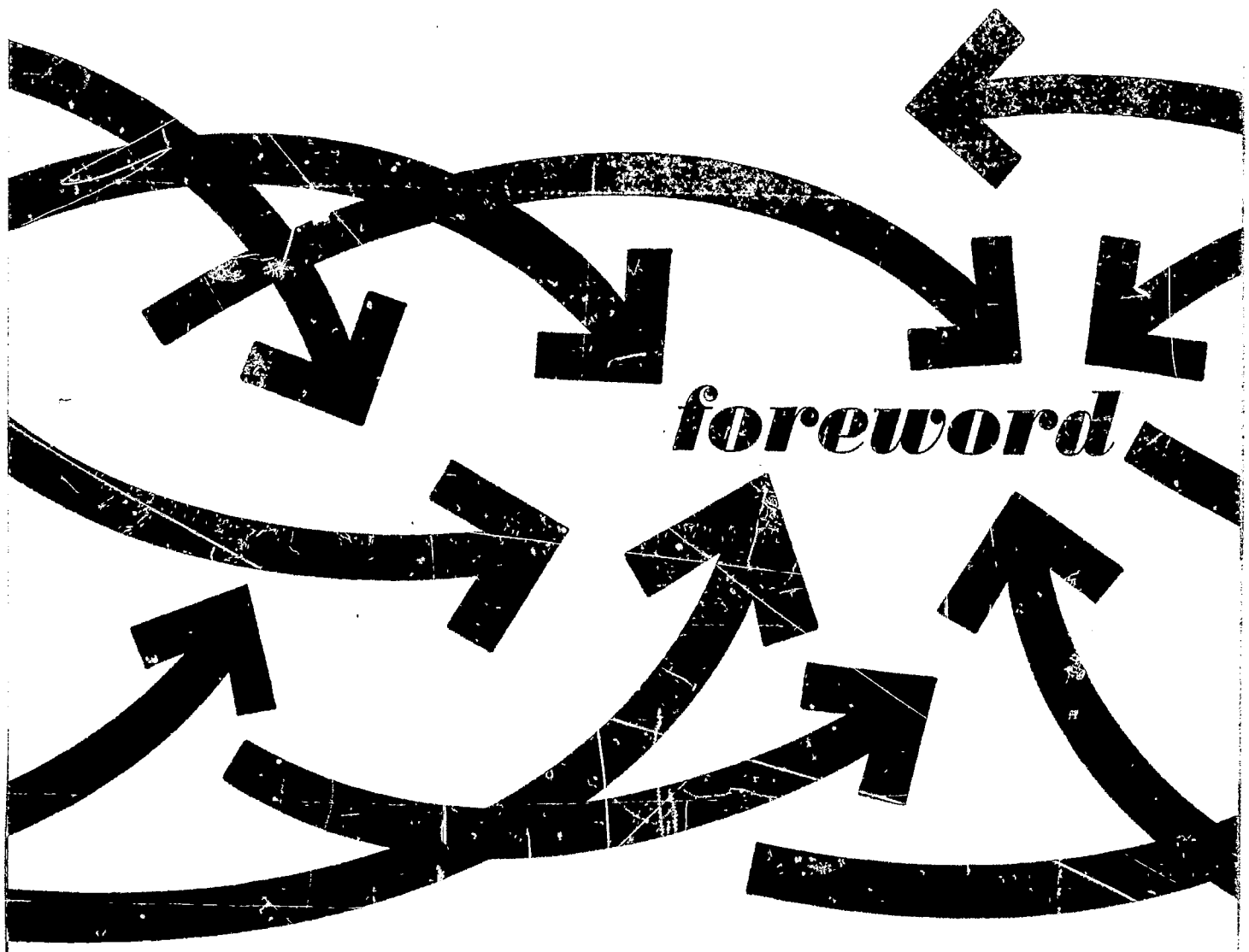


foreword

The adaptation of new knowledge to the practical needs of the Nation has always lagged substantially behind the discovery of that knowledge. In the physical sciences this time lag has been compressed to meet the information needs of large national technical programs. Private industry has also invested substantial sums in creating new products through heavy investments in research. More recently the U.S. Office of Education has undertaken a vigorous effort to bridge the gap between the development of better ways to serve the educational needs of the nation and their widespread adaptation and use. Part of this effort involves giving visibility to communities that have creatively and energetically introduced new curricula, teaching methods, and institutional patterns into their local school systems.

The programs described in this publication were initiated at the local level. Many of the ideas were gleaned from carefully designed research efforts, while others represented commonsense applications to an urgent community need. Some of these projects were successful in acquiring funds from the Office of Education to support the planning and implementation of the new programs. These five case studies reflect, to a large degree, the coordinated efforts of community leaders who were faced with the practical problem of educating their young people for some form of gainful employment. If there is any unifying theme in these studies, it is that each community is attempting to provide a *flexible educational system* to meet the needs of youngsters of various backgrounds and ability levels.

Basically, three factors were weighed in selecting the studies for this publication. They were (*a*) community size, (*b*) geographical region, and (*c*) type of program. We have tried to incorporate in each a description of the community or region involved, the key individuals and groups who brought about the change, and some of the problems encountered and strategies developed for getting people to work together in adopting these new educational concepts.

Case Study No. 1: Bay Area, California, "one world of science, math, english, and shop"

This first study describes the so-called "Richmond Pretechnical Program" now operating in 19 high schools in the San Francisco Bay area. At the core of the Richmond plan is an attempt to end the artificial fragmentation of subject matter that is characteristic of the usual school program. The plan uses the vocational student's practical and occupational interests as a means of developing his general and academic skills. Lessons are not separated into such courses as physics, math, English, and shop, but rather they are combined to make the overall program reflect the real world which motivates and holds the interest of occupationally oriented students.

Case Study No. 2: the State of Georgia, "a network of postsecondary schools"

From a school system devoted almost entirely to training youngsters for agricultural occupations, has grown, in the State of Georgia, a network of 18 postsecondary vocational schools geared to the demands of modern industry that may well serve as an example to the nation. This study describes the planning and "hard sell" required to launch this network, the resulting change in the attitudes of many people, and the invention of new administrative techniques for bringing about close cooperation between State government, local school boards, business organizations, and labor unions.

Case Study No. 3: Warren, Ohio, "work and study for 'functional living'"

This study tells the story of the "Market Street School" in Warren, Ohio. Slow learners from the sixth to the ninth grade, ordinarily early school dropouts, were brought together in an entirely new learning environment. How parents were convinced that their children needed to go to this special school, how an energetic and devoted teaching staff was assembled, and finally how each child was provided with the general and vocational skills needed to lead satisfying, productive lives is dramatically told in this third case study.

Case Study No. 4: Phoenix, Arizona, "a plan for paramedical training"

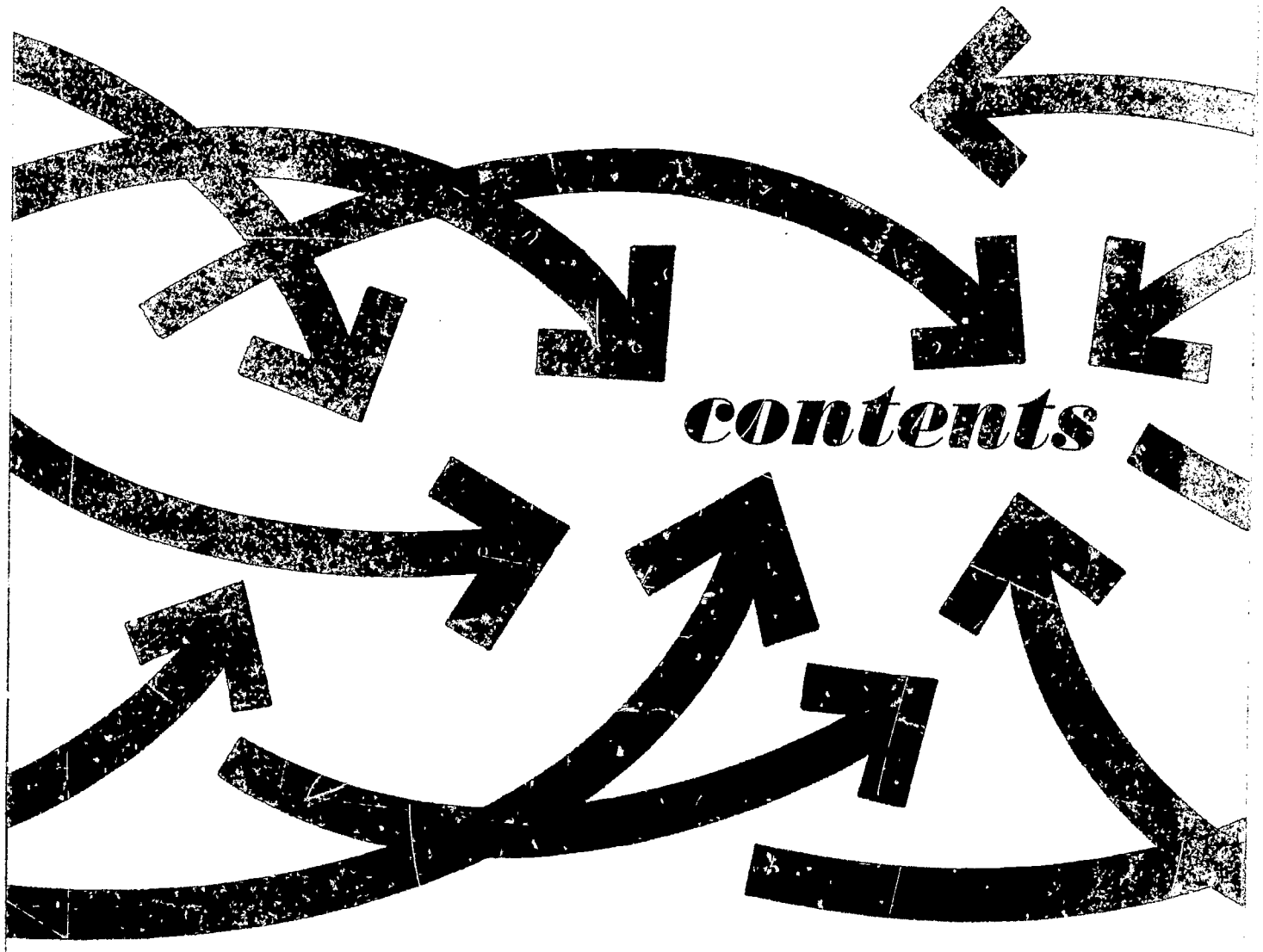
In Phoenix, Arizona, as in many fast growing cities, the number of people requiring medical aid is growing more rapidly than the number trained to care for them. This study describes how one city built into its educational structure a complete paramedical training capability. Organizations representing the various health service professions, hospitals, educational institutions, and educational leaders at the State and community levels all worked together to find a better way to meet a serious need in their community.

Case Study No. 5: Quincy, Massachusetts, "realistic training or families of skills"

This study highlights one of the more dramatic changes taking place in vocational education as it shifts from training youngsters for a single skill to training them for a whole "family" of skills and occupations. This kind of broad training hopefully will prepare the individual to move from job to job or to be better prepared to undertake training for higher rated jobs as technological shifts change the employment picture.

These five studies are but a sample of the many innovative educational efforts now underway across the country. While our focus is on innovations in occupational education, counterparts in other areas of education could also be identified. It is our hope that these examples will illustrate that educators have taken seriously the need for modifications in many of our traditional vocational-technical education programs. Each case study is eloquent testimony to the vigor and dedication of vocational-technical educational leadership at the community and State levels. Each is a story well worth the telling.

David S. Bushnell, Director
Division of Adult and Vocational Research


contents

one world of science, math, english, and shop

bay area, california

1

A few years ago, at a technical institute in San Francisco, a group of Richmond, Calif., teachers met all summer to discuss what to do about a most glaring, but most ignored, need. Their problem was how to revitalize the school lives of average, bright students, youngsters who surely could make it in college-level technical schools, but whose high school grades bordered on failure. The teachers developed a bold new plan. It has met, in many ways, with such dramatic success that the Ford Foundation recently granted almost a half-million dollars to help spread demonstrations of the plan into schools with students of all sorts of social, economic, and ethnic backgrounds. The Richmond Pretechnical Program is now at work in 19 high schools in the San Francisco Bay area.

Teachers envision bold changes

The story of how these teachers perceived a need for bold change, how they converted a vision into a practical program, the resistance they met from less adventurous elements in school and community, and how they overcame these obstacles all help form a dramatic case study of change in vocational education.

The teachers began by facing a question that many students secretly ask themselves: "Why in the world do I have to learn this?" Why are so many students, with mentally and physically active lives outside school, so bored in a classroom that they would rather risk their futures than take the medicine of learning how to learn? How can school be brought more into tune with the real, out-of-school lives of these youngsters?

At the core of the Richmond Plan is an attempt to end the artificial fragmentation of subject matter that typifies the usual school curriculum. Instead of separating lessons under such unreal labels as physics, math, English, and shop, schoolwork tries to reflect the real world of interrelated knowledge.

A theoretical discussion to explain that approach could easily take a whole book. But the approach is perhaps best understood through a series of practical incidents that occurred during the second year of the experiment. William Plutte, then principal of De Anza High School, one of two Richmond high schools where the Richmond Plan started, happened to come upon a device that seemed to offer a worthwhile shop project. It was an assembly kit for building a sound synthesizer, about the size of a cigar box. Besides providing practice in wiring and soldering, as well as reading plans, the assembled device would produce the sound of any vowel. To help students get more from the experience, the shop teacher connected it to an oscilloscope, so they could make visual observations of fine differences in enunciation. That was only a beginning, however. The physics teacher tied in with the shop project by scheduling lessons in sound theory, wave theory, and the conversion of sound into

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light. Simultaneously, the math teacher took up problems in the speed of sound and plotting of curves. English became part of the project too. The English teacher, Winston W. Howe, who also taught shop, or "tech lab" as it is called in the Richmond Plan, asked students to write technical reports on the theory and use of a sound synthesizer as well as on the physics and mathematics of sound. Thus, their interest in the device became the vehicle for practice in precise use of the language for accurate communication.

Still, the teaching potentials of the sound synthesizer had not been wrung dry. Mr. Howe got the idea one day that the sound-making box could be a marvelous tool for a new kind of lesson in oral English. One of his students, a recent arrival from Arkansas, had a regional dialect that was almost unintelligible to his classmates. Mr. Howe had the boy observe pure, machine-made vowel sounds in the oscilloscope, then compare them against the visual waves of his oral vowels spoken into a microphone. The boy was astonished to find how different his vowels were from those of the machine. He kept changing his spoken vowels until they resembled those of the machine. To the boy, this was not dull English drill but fascinating science, organically connected to his growing interest in physics, math, and shop. The boy's speech improved dramatically. Other students undertook the same exercise and found equal rewards. The simple kit furnished seemingly endless learning possibilities that kept the class busy from early September until Christmas vacation.

"In the same way," says Mr. Flutte, now the principal of Harry Ells High School, Richmond, "a familiar device like a pinhole camera helps make all the other disciplines meaningful. A student may make a camera out of a shoebox or come up with a fancy telescopic arrangement. Either way, he suddenly knows why he takes math. He needs math to figure distances that will bring his pictures into focus and to measure time for getting proper exposures. This gets him into physics—refraction angles and all those things—and each learning experience can be a subject for a written report that he's really interested in. The English teacher duplicates copies of these reports, so each student gets one for analyzing and criticizing. Their discussion gives them oral experience. At the same time they pick up ideas from one another and find where they failed to get their own ideas across. The next time they write, it will be a little more clear."

"Instead of a nebulous curriculum with a lot of pedantic objectives, we want the disciplines to grow out of solid, practical applications. We try always to imagine the student asking, 'Why do we have to learn this?' If the teacher can only answer, 'Well, this is good education,' we say forget it. But we know we're on solid ground if a teacher of an academic

subject can say, 'You're going to learn this because tomorrow we're going to do such-and-such a project. If you don't understand this today, you won't be able to do that tomorrow.' As much as possible, we want classroom work to be a bunch of building blocks."

Demonstration classes

In each of 19 schools, about 60 students a year are enrolled in the "pretech" demonstration classes. Their IQ's generally range between 90 and 115, but their school achievement is poor. According to past statistics, about one-third of them could be expected to drop out before high school graduation. The remainder would pass with borderline grades, many presenting severe problems in discipline. Yet of the first 58 boys who entered the special pretech classes at Harry Ells, of whom 20 could be expected to drop out, all but 2 graduated. Most went on to higher technical education. Recently, a typical group of 19 pretech seniors took an achievement test to find out if they were ready for college-level English. Of the 19, 17 passed.

"What we have here is not only a pretech program," says Burton H. Johnson, guidance counselor at Harry Ells High, "but a good program of general education. At the beginning, we didn't dare call it a program to qualify for, say, State colleges. We'd have had a lot of teachers saying, 'You can't do that with these youngsters.' But the majority of our pretech graduates have qualified for Contra Costa Junior College. Several of our boys there are now planning to transfer to 4-year State colleges. We have a couple at San Jose State College, one each at the University of the Pacific and the Maritime Academy, and three at California Polytechnical, a 4-year college, where they're doing extremely well. One boy got an A in calculus there, the others are doing B and C work, which is par. They'd never have made it without this program. We have one student at San Francisco State College majoring in English. He wants to be a teacher. We have six boys in junior college who have changed their majors from technical courses to accounting, business administration, and so forth. They're shooting for bachelor degrees and CPA licenses. We also have boys who went right to work at Pacific Gas & Electric Co. and Standard Oil. To get their jobs, they had to pass entrance exams, and now they're moving right along."

The Richmond pretech program was first conceived by a man who had never set foot inside a Richmond school. He is Marvin Feldman, vice president for development of Cogswell Polytechnical Institute, a private postsecondary school in San Francisco, where he also taught mathematics. Mr. Feldman became increasingly appalled at the poor mathematics preparation which many high school graduates brought to Cogswell. He designed a 19-week "cram" course to help them catch up,

but he felt the students really needed help earlier. In high school, they had acquired a habit of just getting by—or of failing—and expected more of the same.

He determined to find a public high school that would consent to an experiment of special instruction in high school, relating math to science. From the Rosenberg Foundation of San Francisco, he obtained a promise of a $15,000 grant for curriculum development upon finding a school that would cooperate.

Hidden agendas

"I made the mistake of starting out by visiting school superintendents first," says Mr. Feldman, who is today a staff member of the Ford Foundation. "I soon decided that wasn't the best place to start. A superintendent is surrounded by the pressures of teacher associations, curriculum people, and a whole hodgepodge of vested interests. I don't think you ever really bring about change by hitting head on. You have to sneak into the school if you want to start changing it. You have to start with a single teacher who is enthusiastic, then work your way up through the bureaucracy to the school board. Change has to be based on people's selfish motives. You have to find their 'hidden agendas' and work from there."

The enthusiastic teacher Mr. Feldman found was Mr. Johnson, guidance counselor of Harry Ells High School. "I was a counselor in junior high until Harry Ells opened in 1955," says Mr. Johnson, revealing the starting point of his hidden agenda. "Counseling our first graduating class, I first became acquainted with technical colleges and the whole world of technology, which I hardly knew existed before. I found out, too, after talking to people in industry, that all the big talk about the shortage of engineers was misleading. The real shortage was in technicians. They were so scarce—engineers were doing routine jobs—doing the 'do' instead of the 'think.' Every Sunday, the *San Francisco Chronicle* had two pages of ads for jobs in industry, and more than half were for technicians."

Technicians or engineers

Feldman and Johnson invited a group of teachers to dinner to discuss new ways of better preparing students for these opportunities. They decided their first problem was to identify the student they meant.

"It's so easy to be deceived by his IQ, his previous school record, and so forth," says Mr. Feldman. "We decided to identify him intuitively first, then look at the data later. The important questions are: What does he want? What interests him? What is he learning in life, while he's not learning in school?" "The excitement of Sputnik and missiles," says Mr. Johnson,

"made lots of kids want the status of engineers. But when they came up against the new math—the bread and butter course for engineering—the average fellow couldn't compete with the mathematical whizzes headed for the big universities. He couldn't qualify for the more advanced math courses. That kind of boy can be a good technician but doesn't know how to go about becoming one."

"We were also interested in the boy that Feldman and I called 'the hot-rodder.' He was getting through algebra but couldn't see any reason for studying Julius Caesar in English and wanted no part of a foreign language. He'd tried it and had enough. If a school insisted on cramming it down his throat, he was going to leave first chance he got. We know that some of these youngsters have the intelligence to go to the University of California, if they had the motivation. But all of them have real ability for succeeding in other ways."

Help for the average student

"Nobody wants to do anything for the average youngster," adds Mr. Plutte, the principal, who attended the first dinner meeting. "We have all kinds of funds for the gifted on the one hand and the delinquent on the other. If you're a good kid who comes to school every day, and you sit there and come up with a C, you can go through school for 12 years and nobody will remember you."

"What we needed was a whole new idea in curriculum," says Mr. Feldman, "but I wanted the teachers to work it out themselves. Teachers are so used to someone else giving them a cookbook. Even if it's a good cookbook, it's still someone else's, and the teacher is not really involved."

With the small grant from the Rosenberg Foundation to pay modest sums for their time, the teachers met all summer to work out lesson plans. The foundation then contributed another $15,000 to launch the plan in an 11th-grade class in each of two Richmond high schools, Harry Ells and De Anza. These classes would continue the experiment in the 12th grade, while two new 11th-grade classes would start with it again.

"I was against this whole program when it started," says James Kelly, a mathematics teacher whose conversion to the Richmond Plan is in itself a case study in change. Mr. Kelly had a virtual monopoly on bright math students, teaching all senior and most junior math as well as an advanced placement class on a university level. "When I heard there was a plot afoot for some new kind of math for these students who had all but flunked in our regular classes, I saw all sorts of threats. For one thing, if some new course was successful where I had failed, I was going to be marked as a pretty poor teacher. The entire math department walked into Bill Plutte's office as a body, and I pounded on his

desk. 'If you need math teaching done, we're the qualified teachers.' Maybe we were angry because we weren't involved in planning this thing. Well, they went ahead with it anyhow."

Math in the shop

"It happened that their math lab was in the room across the hall from me. One day I followed their teacher into his room to see what the kids were doing. He wasn't a regular math teacher at the time, but a general shop instructor, which I can assure you caused plenty of comment among the other teachers. There he was, erasing the blackboard and chalking up some new problems. It wasn't just a bunch of watered-down arithmetic. There was some real math going on there. I began to watch and listen and talk to some of the youngsters in the program—some of them my former students who had been nothing but trouble—and became interested in the thing. Once you cool down after you've lost an argument, you begin to look at a situation objectively. I began to see these youngsters learning math—not what we were teaching in the university prep program, yet substantial math."

"Next, I began watching the esprit de corps these boys were building. You could see the change—in their personal pride, the way they cleaned up and dressed better, and the way you stopped hearing their names in the teachers' lounge as the discipline problems. Even their attendance pattern improved."

"Well, I had always griped about the educational vacuum for kids in the big middle range. Here, suddenly, students in that big middle were being taught. There was only one thing to do. I went to Bill Plutte and asked if I could get into the program. Next fall, I became the math teacher on the tech-program team."

By year's end, Kelly's fellow team members chose him as their chairman. Soon, Mr. Kelly began hearing from other teachers the charge that he so recently had made: that pretech math was watered down. "If anything," he once replied to a colleague, "it's the other stuff that's watered down because it's abstract and too many students aren't getting it. This is more rigorous because it's applied and real."

Like other teachers in the pretech program, Mr. Kelly had to learn to juggle the order of subject material to make it mesh with other instruction.

"Your first commitment has to be to the program, not to a textbook," says Mr. Kelly. "At least 50 percent of the time the disciplines have to operate together, and the rest of the time we can take breathers to fill in theoretical gaps. For example, the science class took up their unit on stress and strain when students were building miniature-scale bridges in tech lab. That was when I jumped in with math, having the youngsters

work out what would happen if this 4-foot bridge were enlarged to cross a gorge of 75 yards. Always, we take a problem-solving approach. Sometimes we have to ask students to memorize something we're not ready to explain. But they'll do it if they see a reason for it. I'll say, 'Okay boys, tomorrow in tech lab you're going to have to use this law of cosine. When you get to an angle bigger than 90 degrees, as you'll do tomorrow, the cosine changes to sine in the second quadrant. Today we've got to memorize *what* happens, and next year we'll find out *why* it happens.' "

"Some say this is terrible education. But it works. Next year, the student really learns the law of cosine because he already understands something about its application."

Mr. Howe, the English and tech-lab teacher, adds, "I used to worry a lot about the lack of structure in all this—that you would wind up at the end of the year with a lot of blank spots, like parts left over after you reconstruct a clock. But the longer I teach in this program, the less I worry. The material just seems to fall into place in a most natural way. Hardly anything's dragged in extraneously, and all the necessary elements get used."

Day-to-day shifts in lesson plans, born of unforeseen needs, soon rendered almost useless the carefully designed curriculum that grew out of the summer planning conference. The plan was merely a starting point for improvising a totally new program that grew from the solid experience of daily classroom instruction. Still, the summer of discussion was essential to charting a course and a philosophy for the pretech program.

English—a tool for communication

"We had talked not only about subject material—science, math, and so forth," recalls Mr. Plutte, "but about how to get students into an attitude of wanting to learn. In English, for example, we asked ourselves, 'How do we want to bring literature in?' I remember one young English teacher, not in the program, who was very disturbed that her boys just refused to read certain essays. I asked her, 'Did you ever think of letting them go into the library to read *Popular Science* and let them give you a report on that? At least they're reading.' This is what has 'fractured' these youngsters—reading about birds and bees and Shakespeare, writing about 'My Vacation Last Summer' instead of things they're interested in. Every child has some strong interest that he'd be happy to tell about. But no. The English people at De Anza, hearing about our plan, wanted a meeting with me. We sat around a table, and the teachers said, 'Is it true? You're not going to give them Shakespeare?' I realized they weren't pulling my leg. They couldn't get away from their preconceived ideas of what English has to be. And when you

say that an important purpose of English is to help develop a 'tool for communication,' it's as if you're using a dirty word."

"Well, our pretech team decided that an important thing we want these youngsters to get out of English is the ability first to write a sentence that's intelligent, and then a paragraph. If he can learn to write it and you can understand it, the rest will start coming."

Conventional English teachers who insist on imposing their literary tastes on all students, whether students like it or not, sometimes reveal a contempt for the vocational education student whom they claim to be so eager to edify. This was brought home to Mr. Kelly, the team chairman, when a group of 18 teachers from another school visited De Anza. Mr. Kelly asked an English teacher if she would like to see what the boys were making in the tech lab. "Heavens, no," the teacher answered with a haughty laugh, "I'm an English teacher." Mr. Kelly was shocked that she had said this before the entire visiting group, and no one seemed to feel her comment was unreasonable. Shades of similar haughtiness appeared among De Anza teachers when one day a sign appeared over the coffee urn in the teachers' lounge reading—half in jest, but half not—"Help Stamp Out Technology. Join An Art Class."

Still, English lessons for pretech students are by no means devoid of what others consider "serious literature." Lively discussions on the form of the novel have taken place around works in science fiction. Aldous Huxley's *Brave New World* has provided an exciting adventure in literature. After a year of such reading, interwoven with exercises in technical writing, students did indeed take up *Hamlet* during their final week and found unexpected attractions in it.

Mr. Howe one day found an unplanned use of the lesson plan his colleagues had spent a summer preparing. The plan was preceded by a 4-page description of the philosophy and goals of the pretech program. He introduced it to his English class as an exercise in reading. After a lively discussion, Mr. Howe gave the students a quiz on comprehension of the text. Their high grades verified his observation of their deep involvement in the material. "And," Mr. Howe adds, "it turned out to be very good counseling, too."

A lesson in the practical importance of careful reading came when pretech students visited the Chevron Research Laboratory. An engineer addressing them commented, "If you're listening to me, I'm sure you're learning something. But when you work in a place like this, what you know often doesn't mean much unless you can write it down and communicate it to someone."

"Next day in English class," Mr. Howe commented, "you could

just feel that that fellow had hit home in a real way The students had a new, realistic notion of what writing was all about."

More drafting work

Field trips to laboratories, Government experimental stations, and industrial plants are an important factor in bringing realism to the pretech program. The benefits fall not only on students but also on teachers, who frequently have only vague notions of how people outside education do their work. The benefits of realism are also brought to the program by former pretech students. Says Mr. Johnson, the guidance counselor, "We learned from our boys who went on to get jobs as engineering, chemical, and architectural technicians. A lot of them said they wished they had had more drafting. So we stole a little time from our physics instruction. In the 12th year, instead of 3 days of physics and 2 of drafting, we now schedule 3 days of drafting and 2 of physics."

Mr. Johnson has been gratified to discover that he has been all but elbowed out of his position as counselor to pretech students. The teaching team has been taking over much of the function. "They requested it, and they like it," says Mr. Johnson. "They meet every day over lunch, and one teacher will say to another, 'Listen, Joe, Bob keeps "goofing off" in my class. You're close to him. What do you think we can do?' I don't enter the picture unless it's really needed, and it seldom is. This is great. The teachers know the youngsters far better than I do. One even has an open house at his home every Wednesday night to 'chew the fat' with the students and encourage them."

As another realistic counseling device, visitors from industry address the students and answer questions on as practical a matter as salary ranges. "The trouble is," reports Mr. Kelly, "that some of the kids have exalted ideas about what their potential is as a high school graduate. A boy coming out of this program, even without going on to 2 years of college, is immediately employable. He sometimes misinterprets this by thinking he's all equipped for a profitable career where the sky's the limit. These talks by visitors help straighten out the students' perspective."

Interested teachers

Obtaining suitable teachers for the program is one of its most difficult aspects, says Mr. Plutte. "They have to be genuinely interested in youngsters, have a good background in subject matter, and, hardest of all to find, they have to be adaptable. A teacher in this program has to have the ability to say, 'If a lot of students failed, I failed to present it right. Let's go back and start over again.' They have to really care, because they put in a lot of extra time, meeting and planning. You can go

into our lounge any time between 2 and 4:30 in the afternoon and find two or more tech teachers sitting around talking about things they're going to do."

"I don't think you can retread teachers on a very wide scale for this," says Mr. Kelly. "We've had to retread teachers, but that's not the ideal way. Preservice training instead of in-service is the real way to handle this kind of thing. I'd like to see a teacher-training institute grow right here at De Anza High in a separate building next door. Student teachers could take some of their instruction there, then get involved working with us in on-the-job training for an interdisciplinary program. This would help them keep from getting too specialized. Then they wouldn't have to go through the difficult metamorphosis that I had to go through."

Parents want college

These new, imaginative approaches to curriculum, while saving potentially successful students, do little, at least at first, to break down the resistance of parents against any program that does not have the status of university preparation.

"Schools would be easy to run if we didn't have parents," says Mr. Plutte, only half in jest. "Right now we have about 60 youngsters in the 10th grade who meet our criteria for starting in the tech program in the 11th grade. They have average IQ's or higher, but are close to being lost academically. Yet we're going to be lucky to sign up 30 of these youngsters Why? Because each one started out as college prep. The kid next door or his cousin went to college, and his parents won't let him think of anything else. Thirty years ago, when his parents were young, to get into college you just had to be a warm body and be able to sign your name. But things are different now. Sure, the boy's only doing C and D work, but the parent insists he'll catch up. 'My boy's a late bloomer,' the parent always says. We try to overcome this by having meetings of parents before the youngsters are programed. We explain the pretech idea and have students already in the program talk to the parents' meeting about what they're getting out of it. That way we try to line up the parents as allies instead of adversaries in helping the student make up his mind."

Success instead of failure

"We need them as allies, because sometimes certain tech students themselves can be an obstacle. There are always one or two youngsters failing or near failing in pretech who go around saying, 'Don't get into it, it's a Mickey Mouse program.' I want to get our successful students to talk about what they're doing—not to do a selling job, but just to counter the adverse publicity that comes from one boy who may not be doing well."

Growth of the pretech program has had no visible opposition from the administrative offices of the Richmond school system, although active support has not been typical either.

"One assistant superintendent of schools has been particularly interested," reports one of the program participants, "but it's pretty hard to get other administrators moving. They give lip service to it, but anything new like this upsets the applecart. An administrator who's been here for years figures, 'Why do something different? We have a good record of getting students into the University of California and that's what counts.' They haven't put up roadblocks, but they don't get excited about innovation either. We were able to put the program over mainly because the Rosenberg Foundation offered the money to prepare teachers. As long as it wasn't going to cost the district any money, the people downtown were willing to go along without giving us any trouble."

After the success of the pretech program appeared evident at De Anza and Harry Ells High Schools in Richmond, the Ford Foundation made a grant of $450,000 to move the plan from its pilot phase to a series of demonstration projects. The grant established the Center for Technological Education, affiliated with San Francisco State College, with offices in Daly City. The center is charged with trying to duplicate the pretech program in schools of a wide variety of economic, social, and academic atmospheres. One of the critical problems faced by its director, Dr. George Champion, is to find ways of providing evidence that the program increases success for students who were previously near-failures.

"We do know that the program retains students in school," says Dr. Champion. "The likelihood of this type of student going on to higher education has been extremely low. Yet, a survey of students in pretech shows that at least 78 percent are now interested in going on. We don't yet know what the pretech program really does for their high school grades, even though their grades for pretech courses have been considerably higher than their averages in the past. Their grades in social science will be the key, because social science is not part of the program. If their social science grades go up, we can feel pretty sure the results represent a change in their learning behavior and not just a difference in grading in the pretech program."

Discipline problems disappear

"One most important thing that I've observed: I have yet to go into a school and hear a pretech teacher say, 'Oh, If I didn't have to put up with this discipline problem.' Discipline problems seem literally to disappear. Remember, we're talking here

about a type of student who has been as disruptive as any in the school. Psychologically, he's a rebel. It's easy to theorize on the reasons for this change, but we need to know more about it. I think some case studies need to be made on a sampling of these youngsters."

At De Anza High, Mr. Kelly adds some specific observations of change in behavior. "Since we're operating with boys only, you might think these youngsters would have a problem being separated from girls and other normal school associations. We've talked about this as a potential problem, but it simply hasn't materialized. Last year the entire starting lineup of the school basketball team was made up of tech boys. They made up about two-thirds of the football team, including the star quarterback. The president of the junior class is a tech student. These boys are active and involved. They're not segregated from their peer groups. They have their girl friends. In fact, the only real difference between them and anyone else in a comprehensive high school is in the kind of schoolwork you can demand and expect to get from them."

Many people feel, says Dr. Champion, that the real evaluation of the pretech program will be in measuring the success of its students after they enter junior college. Dr. Champion, however, questions this.

"It's a measure, true," he allows, "but suppose every student failed his first semester in junior college. That wouldn't prove that the program had been bad. What about the student who goes directly to work after some training here? There are training programs in industry that he can enter that will carry him beyond what we've given him. Instead of being a dropout, you'd be able to call him a dropin. Maybe it's about time we began looking at the 'dropin' pattern—of students who fail in school but then find new ways of succeeding in a meaningful learning situation."

Of course, Dr. Champion does not expect that pretech students will have great difficulty making the grade in junior colleges. In fact, quite the opposite: "Normally, many students who enter a 2-year junior college are still exploring. When a student wants to make a change during his exploration period, he often loses a semester. I have a sneaking suspicion that as pretech students move into junior college in great numbers, you will find that their exploration period is not required. Their goal orientation will have been established in high school. You will have fewer changes in majors with this group than with average junior college students. But we need to test this out."

Opening new opportunities

The pattern of the pretech program has already spread into a new major occupational area, mass food preparation, and may

soon enter still others. Soon after pretech was launched, Marvin Feldman was approached by Oakland Technical High School with an idea for a commercial foods program. The idea soon bloomed into a pilot course and a $75,000 grant from the Ford Foundation to the City College of San Francisco Hotel and Restaurant Foundation to develop and spread Project FEAST (Food Education and Service Technology).

As in the pretech program, science, math, and English are related to the problems of mass food preparation. Counseling, too, is geared toward understanding the wide variety of goals in the food service industry. One of the striking facts of Project FEAST is that male students make up more than three-quarters of its enrollment. Mrs. Hilda Watson Gifford, Project Director, points out:

"A student can become a cook, a storekeeper, a purchasing agent, a catering manager, a hotel keeper, or may decide to go on and become a CPA. There are chef's jobs today at $25,000 a year that are going begging."

"These students do their lab work in basic food preparation, the same as in any home economics class. They'll learn science as it applies to cooking and nutritive values. Then they start cooking in quantity for a dozen or 25. Soon they move into the school cafeteria where they cook for 50, or 100 or more. This is where arithmetic really becomes practical. They learn the importance of the use of English when they have to read and write directions and recipes, type forms, or write letters of inquiry."

"I get so cross at people who say that this is not a status industry. A few weeks ago, we had a visit from the president of the Japanese hotel association. He's the owner of the Imperial Hotel chain and has been decorated by seven nations for his contributions to international goodwill. He started out by learning to use a paring knife in the kitchen of a hotel in England. He certainly has status."

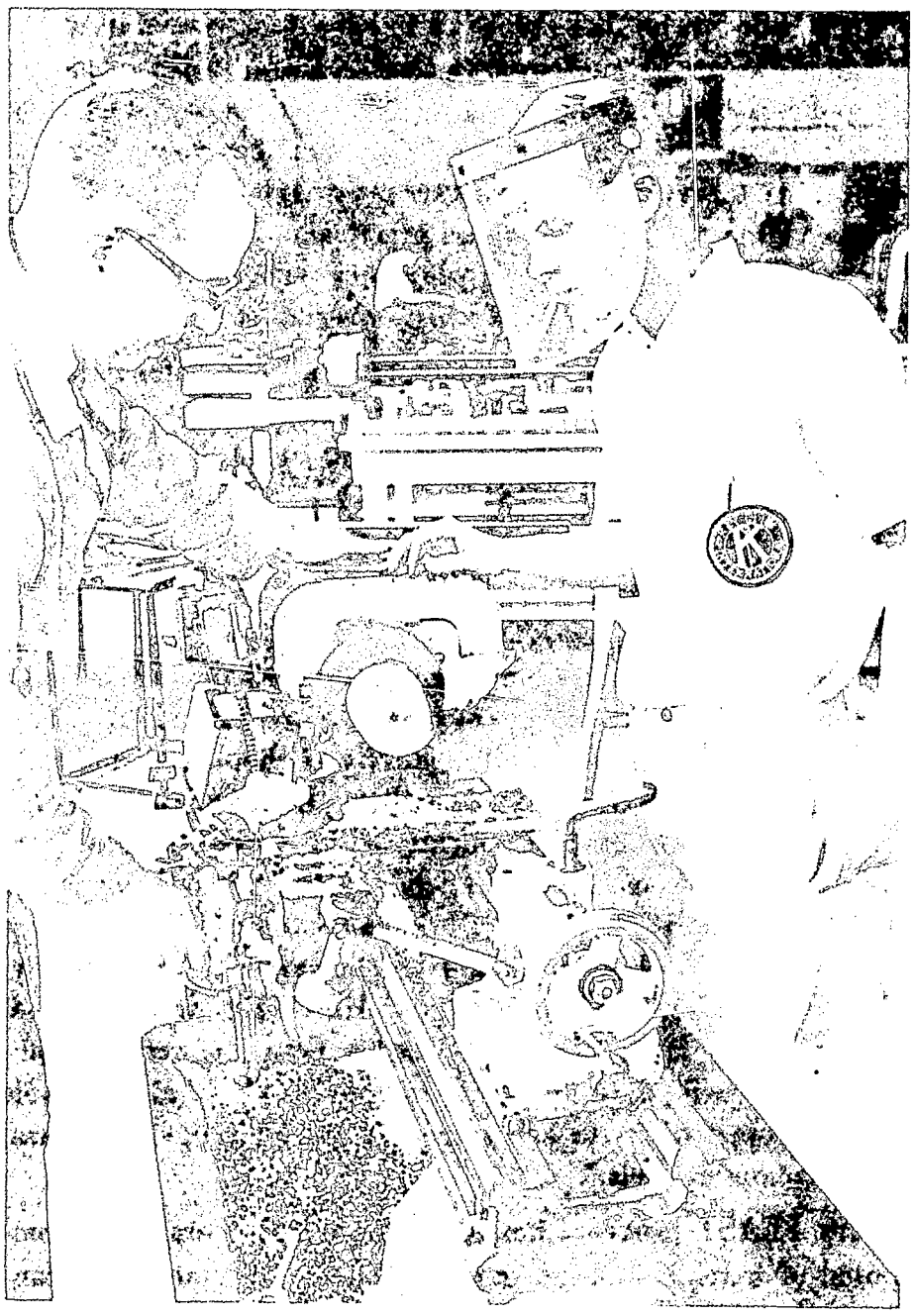
"But even if some adults don't know it, the students see the status in this work. Two years ago in 1964, the first FEAST programs were opened at Oakland Technical High School, Oakland, and at Pacific High School, San Leandro. In 1965, Balboa High School of San Francisco, Capuchino High School in San Mateo County, and Ravenswood High School in East Palo Alto opened. We didn't approach them. They came to us. The students wanted it. In 1966, Sequoia High School in Redwood City, Franklin High School in Stockton, Harry Ells in Richmond, and Santiago High School in Garden Grove (Southern California) all will have FEAST programs. These nine schools give the opportunity to experiment on a wide range of cultural and economic levels."

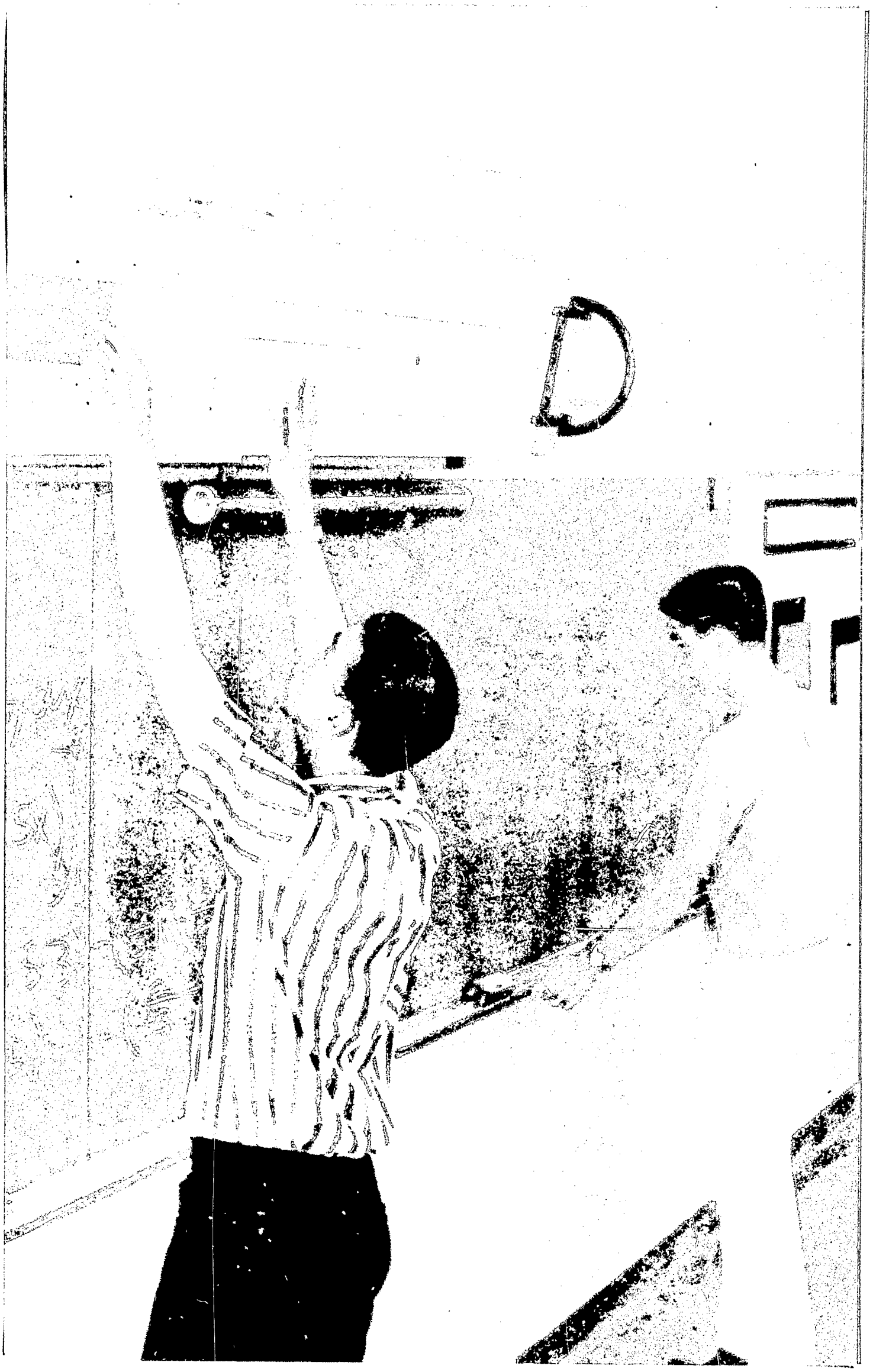
Every FEAST program has its own advisory committee composed of hotel, restaurant, and labor-union officials to guaran-

tee that instruction is geared to the real needs of employers and that placement is assured.

At Richmond, where the pretech program was born, principal William Plutte is starting a FEAST program. At San Leandro and Oakland Tech, pretech and Project FEAST teachers have begun to plan programs to meet the new demand for hospital personnel brought on by medicare. Richmond's James Kelly now talks of training youngsters, through the integrated-curriculum idea, for technical sales, technical writing, and production management, each a field critically short of trained personnel. Mr. Plutte suggests that business administration and commercial art are two other likely possibilities.

Perhaps the Center for Technological Education will soon find itself establishing demonstration programs along these new frontiers of pretech training. But the pretechnical program, born in the minds of a few enthusiastic teachers at Richmond, will meet its real test when the idea begins to spread by itself.





a network of post-secondary schools

state of georgia

2

The sweep of technology across American life, and its swiftly changing demands on human skill, is in no place more dramatically evident than in the State of Georgia. Take what has happened on the outskirts of the town of Marietta. In the gentle roll of terrain where mountain timberlands ease into peach orchards and spread southward into cottonfields, a traveler sees from the road a seemingly endless stretch of low-slung structure. It is the largest aircraft factory under one roof anywhere in the world, employing 26,000 people. They range in skill from assemblers and welders to systems analysts and mathematicians. Hardly anyone works there who is untrained.

Revolution in Georgia

The technological revolution has not only drawn Georgians from old jobs on the farm to new kinds of jobs in the city, but has changed the character of work on the farm itself.

"When I was a kid before World War II," says R. E. Bodenhamer, assistant state supervisor of trade and industrial education, "in my county there weren't more than 20 tractors. Almost everybody drove a mule or a horse. Hardly any farms had electricity. Today, all those people have power equipment, and their farms are electrified."

The people of Georgia have endured great strain, socially and economically, trying to bend their way of life to keep up with this change. Similarly, the State's system of schools has been under constant stress to create a new kind of work force out of the traditions of an old one. In vocational education, the change has been as aggressive and dramatic as in the world of work itself. From a school system recently devoted almost entirely to producing youngsters prepared for lives of agriculture, there has grown a network of 18 postsecondary vocational schools geared to the demands of modern industry that may well serve as an example to the nation. The birth and growth of these schools are an instructive case study not only in change of attitude of a whole people, but also in the invention of new administrative forms for enhancing close cooperation between a State government and local school boards, business organizations, and labor unions.

Training for the new technology

About a decade ago, William Hicks, state supervisor of trade and industrial education, perceived the rapidly growing need to train new kinds of men and women for the new technology.

He knew that changes in public attitude do not come readily, no matter how clear the change in public need. He knew that a state steeped in agricultural tradition was bound to resist making huge outlays for industrial schools, the very idea of which stirred hostility in many traditionalists.

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Mr. Hicks developed vivid charts to show the changing character of work and trace the movement of Georgians from farm to city. He pinpointed the places where the need—and the opportunities—for trained workers was greatest. These were the logical places for building new schools of industrial skill.

Packing his charts as baggage, Mr. Hicks toured and retoured the State, speaking before civic groups, chambers of commerce, school leaders, parent-teacher associations, and to anyone who would listen. Tirelessly, he campaigned for almost 3 years, trying to create a climate of potential support when the proper day came for making an official proposal to the State. Simultaneously, he took every opportunity to visit legislators and members of the governor's staff, further softening the ground.

Newspaper coverage of his talks and word-of-mouth reaction fortified the impact of his travels. By 1958, he felt the time was ripe to make a formal proposal to the legislature and to the governor. The proposal was rapidly passed and approved.

Opportunities in Coosa Valley

Mr. Hicks had already arranged his list of locales for schools in order of priority of need. High on his list was the city of Rome in Floyd County outside Atlanta, the most industrialized area in the rapidly changing State. The story of the Coosa Valley Area Vocational and Technical School typifies the histories of its 17 brother-schools around the State.

"Our industries got behind it right away," says C. M. Culberson, director of the school, "because they were feeling the shortage of skilled labor. The chamber of commerce people were interested because they felt it would be a good drawing card for new industry. One other thing helped us. Even though we have two colleges within the county, people began to realize that a large number of our high school students weren't going to college. We had to do something to prepare these young people for making a living."

The State law for building these area vocational schools required that local communities put up half the construction money. Thereafter, the State, aided by Federal funds, would pay the salaries of instructors and administrative staff; the local community was to cover maintenance costs. The initial amount required locally was $250,000 to match an equal appropriation from the State. Because of the support of the local newspaper and influential industrial leaders, the bond passed handily by a margin of 4 to 1.

The only hesitation in support of the bond issue came from organized labor, particularly in the construction industry. "It was just a matter of misinformation," says Mr. Culberson. "Some union people were afraid we might have bricklaying

classes, turn out bricklayers by the hundreds, and run the union out of business. After showing them what courses we really were going to have, we explained we were not in any way trying to affect their relations with employers. In fact, we emphasized that we would like to help the union in its own training program. Now the union is helping us work out some classes to upgrade their present members and to take part in their apprentice and preapprentice training. I don't know what made them distrust us in the beginning. The nearest I got was when one union man said to me, 'Well, if the chamber of commerce has a hand in this, there must be something wrong with it.' "

Offering the right instruction

"Our biggest problem," says Mr. Culberson, "was in making sure we were offering the right instruction. Through the chamber of commerce, we made a survey of local industry to determine what kind of training they wanted. We organized advisory committees. We got the tool and diemaker from across the street for the courses in machine shop. We got owners and foremen from other machine shops, union officials, and some working machinists. Then we'd sit down and ask ourselves, 'Well, what do we want to teach? What should be the requirements for entrance? Should we take only high school graduates or let in someone who might only have finished the 10th grade? How long should the course be? What equipment do we need? What qualifications should we require of our instructors?' We tried to gear these questions not to old ideas about how to run a school, but to the new, practical needs of real industry. Our advisory committee on mechanical technology decided there was a need for a level of training between the tradesman and the engineer—a sort of engineer's aide. This was a growing need nationally as well as locally. This committee met once a week for a year. We had no existing curriculum to go by. Soon after we designed a whole new curriculum for production designers, primarily in metals, the U.S. Office of Education came out with one. Our fellows were pretty proud that our plan was like theirs, almost right down the line."

"Most of the committee didn't have to take that long. But they'd have problems with people who had personal biases. In electronics, some wanted to go heavy on communications and others on the industrial angles. But they always worked it out. The committees still meet to consult with instructors, revise their old plans, add something, or take something out."

"That mechanical technology course was delayed for a year because of all the careful planning. But we started right away with electrical and electronic technology. On a trade level, we offered air conditioning and heating and a course in servicing

electrical appliances. Also, we started right off with auto mechanics. We needed drafting, but had to put it off for the first year because we lacked an instructor. We had practical nursing from the first year, as well as limited offerings in business education, because we had only one teacher. Soon we jumped to three. Now we have four."

"During our first year—that was 1962–63—we got mostly the lower ability students. I don't know where the better ones were going. Maybe they took jobs or went to college or to one of those commercial-technical schools where you may pay $1,200 a year. But word got around that our courses were pretty tough. Then we began to get better students, the ones who would do well in college but who didn't want to go. Or maybe they were the ones who could make it in college but couldn't afford the cost. They can go here for $45 a year, and if they can't afford that, we'll give them some job so they can work out the cost."

Alfred E. Jones, assistant director of the Coosa Valley school, emphasizes the wide gap between the high school preparation of most students in the area and their real training needs.

Preparation for what

"About 15 percent of high school students around here go to college," Mr. Jones points out, "but the full 100 percent are taking academic courses. In preparation for what? The 85 percent who don't go to college finally graduate unprepared for anything else. What do they do? They go to work in grocery stores, service stations, or maybe in one of the mills around here, as a tender on a simple machine. They're 18 or 19 years old. By the time they're 21 or 22 they get married, and first thing you know they have a child. They begin to realize the value of a paycheck that keeps growing. That's when they come to us ready to learn something. A lot of the students we get are young people who've been out of school a year or two and are finding out for the first time what they want an education for."

"One of the first things we find out is that they don't know much math. They spent a couple of years on algebra in high school, but because they knew they weren't going to college and because they didn't see any other use for it, they didn't learn it. Practically every course we have has math in it. So we have to pump a lot of math into them. But we relate math directly to practical work. Because it has real meaning, they learn it."

"I'll give you a typical case," says Mr. Culberson. "We had a boy, about 20 years old, who'd been working since high school as a sacker in a grocery store. He was married and had one child. When he came in here, we tested him and found him sharp as a whip, suited for almost anything we offered. He picked electronics technology. He finished his courses and got

a job with Western Electric, servicing a microwave station up at Adairsville, about 10 miles from here. His base pay is $110 a week. With overtime he takes home $135 or better. The company has sent him to school in New Orleans, Cincinnati, and Birmingham. If our school hadn't opened, that boy would probably still be sacking groceries. Another one of our boys, graduated from here last year, is a field engineer with IBM in Chattanooga. Before he came in, he operated a machine requiring no skill at all. Before that he'd been a truckdriver. Once he got his basic electronics training here, IBM was able to put him through more specialized inservice training. Now he services computers, both 360's and 1401's."

"Stories like that are our best advertising. A young man comes out of here, starts making $600 a month and drives down past the high school in a Mustang. When other fellows see that car, they say, 'That's what I want to do. I want to go where that guy went.' "

A desire to move up the ladder

Such short-range motivations may be the foundations upon which longer range motivations are built, says Dr. Gene Bottoms, state supervisor of vocational guidance.

"Students in our high schools can be grouped roughly under three headings," says Dr. Bottoms. "First, you've got the college-bound. They're full of aspiration to move on up the ladder. Next, you've got the college-oriented one, who, for one reason or another, can't get to college. He can set some long-range goals, too. He's got his eye on some kind of white-collar job, and will probably get one on some level or another, with or without college. Finally, you've got this big group of high school graduates and nongraduates who are not college-oriented. Some of them may be brilliant, but they have short-range goals. Those are the youngsters who are likely to be married by the time they're 18 or 19, or get a new car. Whatever they want, they want it in a hurry. You have to find some way to make them look further ahead than their culture has taught them to look. Now, these are the ones who leave high school with nothing to do and may turn up at an area vocational school because they're starting to think about their future. So the bulk of our population in these schools, at least when we start with them, are the people least able to set long-range goals."

As that analysis might suggest, the dropout rate in area technical schools has been high. Not infrequently, a class that begins with 60 students in September may dwindle to 15 by the following June. But these figures hardly mean that the students have lost interest. What they do mean, in most cases, is that a student finds even a minimum of training—sometimes less than a semester—gives him a salable skill in a thriving, labor-hungry economy.

A little training makes a big difference

"A fellow who's got even just a little training," says Mr. Culberson, "can get a job. Employers grab them. The problem isn't only that these young people sacrifice a better future for an immediate job. The problem is with employers, too, who would rather have someone on the job right now than wait a little while for a better trained youngster who will be more versatile. I talked to one employer yesterday who had enticed two of our students into jobs as numerical control operators. I was trying to get him to stop hiring our students for a while. But he said, 'Send me some more. They're the best people I've got.' One of them had been with us for only 4 months. Yet that employer wouldn't have gambled on them when they were fresh out of high school. Just a little bit of specialized training made the difference."

"When that happens," says Alfred Jones, "do you say we've been successful or unsuccessful? I don't know. Sometimes these students quit our day classes to take a job. Later when they learn that their training has really been pretty skimpy, they may come back for night classes. But unfortunately, this is not true of most of them.

"Sometimes we're surprised at how little training can make so big a difference. We had a fellow who had come out of the Air Force with a wife and two children. He'd get a job working on a truck platform or making deliveries—jobs like that. That was about the limit of his capability. He enrolled in our electronics course and failed. He went through the course again—and failed again. We said, 'This is all we can do for you. Either take some other course or go back to your old job.' Well, he went to work in Atlanta at the best department store in town, servicing color television sets. He started work in October. The next February, he came to visit us to show his monthly paycheck. It was for $640. The main reason he came back was because he thought we'd give him a diploma on the basis of his big check. Now you tell me. Is that a success or a failure story?"

Employers face the training problem

To help reduce this rate of premature enticement to jobs, another area vocational school, at Marietta, has invited employers to share in the problem.

"Let's take a local employer, Yancey Brothers, for example," says Lee L. Leverette, school director. "They manufacture forklifts and other things in automotive mechanics. When they hire one of our students, they're careful to schedule his hours around his school time. They give us reports on the type of work he's doing so our teachers can reinforce his experience. Also, we

give them reports on how he's doing in school. If he slips behind, they tell him he has to shape up. It's an implied threat that they never have to enforce. That company's not doing this to help us or even to be nice to the young man. They know that if he continues all the way through our auto mechanics course, he's going to be promoted. And they need higher level people even more than they need beginners."

Employers are beginning to discover the value of the area schools in upgrading the skills of their present employees.

"We have people ere from Western Electric," says Mr. Leverette, "who have b n told that if they don't enter a vocational school, they may be out of their jobs in 5 years or so. The electrician who's been trained mostly in big heavy wires is lost when he's faced with modern control systems. He needs training in tube failure, checking and replacing transistors, and things like that. Most of our night school people have been working in industry and are studying to keep abreast of changes."

"I'd say that 40 percent of our students in technical and trade courses, both day and night, are employed fulltime at Lockheed Aircraft. We have one electronics class in which every student works at Lockheed. They're at school from 8:15 till 3, then go to work from 4 in the afternoon to midnight. Lockheed doesn't require that they go to school, but the company pays whatever cost is involved as long as it's related to what the students are doing on the job. Any time we offer courses that may upgrade any of their people, Lockheed publicizes it through their training department and company publications. We have the same courses both day and night, so if a student takes a job that clashes with his school schedule, we can shift him from one class to another."

"The close relationship we have with Lockheed and other employers came about slowly. It was the result of turning out a few students who were valuable employees and getting the industry people to come and see what we had available—our labs and shops, the up-to-date equipment. The real breakthrough came when Lockheed and its unions agreed to bring us into the instruction phases of their apprenticeship program. In electronics, for example, they now use our lab for all their apprentice training. This is from their basic instruction in direct current all the way up to advanced equipment. When Lockheed's instructors use our facilities, they become familiar with our curriculum. Meanwhile, our curriculum responds to their needs. The training and actual practice become meshed like a couple of well-oiled gears. Now several members of Lockheed's training department are on our advisory committee. Their director of training is on our State advisory committee for vocational education. Another Lockheed department head is chairman of our local board of education."

Experienced teachers needed

The most difficult problem faced by the area vocational schools is finding teachers with the sophistication of experience required by the courses, yet willing to accept relatively low salaries.

"Take electronics, for example," says Mr. Culberson. "When we started the course, we looked for a teacher who had lots of experience in transistors, microwaves, electronic control systems. It's hard to find a man with that kind of broad background. Most electronics men specialize. We found one who had been a specialist in radar. He knew his circuits all right, but he had to bone up on transistors. When he got to something like computer circuitry, he had to do a good bit of studying. We're always looking for people with experience, ability to learn, good moral character, and good speaking ability—everything that industry wants. The man we would like for each of our courses is making $20,000 a year somewhere in industry. For mechanical technology, the man we need has to be almost a mechanical engineer. Yet his beginning salary is $712 a month with a bachelor's degree. The two men we have now, both fine men, are teaching only because their jobs in industry caused them to travel too much. It's a constant search and a constant struggle."

To help him in his struggle, Mr. Culberson's school board voted an appropriation for small supplements to the State salary schedule of teachers in the most hard-to-fill categories. At Marietta, Mr. Leverette found another way for at least one teacher. When Mr. Leverette found it impossible to hire an instructor in heating and air conditioning, the trade association of contractors voted to supplement the teacher's salary by $1,200 a year for 3 years in the hope that a good class under a better paid instructor would produce trained help that they sorely needed. The contractors also make periodic visits to classes to coach students.

From vocational to postsecondary schools

Although all 18 of the new area vocational and technical schools are primarily on a postsecondary level, this level is not required by State law. The law permits local boards of education to establish any of three kinds of schools: (1) Postsecondary, (2) schools for a mixture of postsecondary and high school students, and (3) vocational high schools. In six of the schools, the State has recently initiated experiments mixing postsecondary students with high school seniors who have completed their academic requirements for graduation. These seniors take trade and technical courses as electives, then return to their high schools on graduation day for their diplomas.

"If this works out all right," says Mr. Bodenhamer, assistant State trade and industrial supervisor, "we're going to extend it across the board. So far it's been all right. The postsecondary

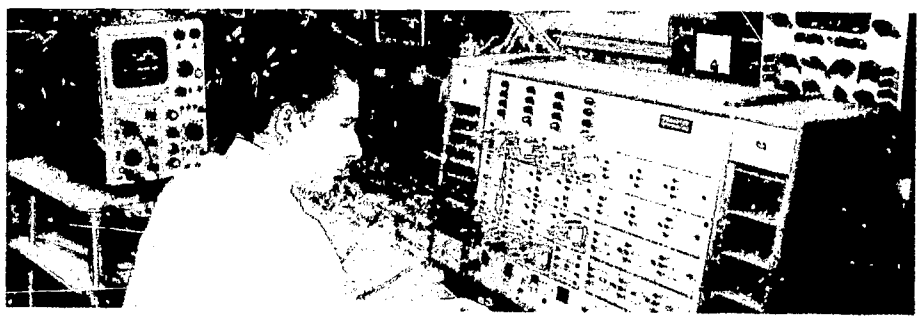
students are accepting it, which is what we wondered about. The high school students are benefiting greatly. It's the psychology of the thing. Before a boy graduates from high school, he's sitting next to someone on the level of a college freshman. It gives him great status, far above that of a high school senior. The following year, he's likely to stay on."

Plans for early training

As a next stage, the State plans to open a network of area vocational high schools. Students will collect in area schools from several towns around, perhaps even several counties. The student's local school district would furnish his transportation as a transfer student to the area school where he would get a curriculum specially designed for occupational preparation—3 hours a day of vocational courses and 3 hours a day of regular academic subjects related as closely as possible to the practical work. This plan is now being tested in 5 areas and may soon be expanded to 12. Vocational courses are industrial rather than advanced technical. Students may study auto mechanics, machine shop practice, heating and air conditioning, radio and television, and sheet metal. As students simultaneously build their knowledge in math, physics, and chemistry, they are rapidly becoming ready for the technical courses offered in the postsecondary schools.

The ultimate hope, says Mr. Bodenhamer, is to begin training for modern vocations with a wide-scale offering of industrial arts in the 7th, 8th, and 9th grades.

"If an industrial arts teacher is a good teacher," points out Mr. Bodenhamer, "he can explain perhaps more clearly than anyone else that if a boy or girl is to succeed in the world of work, he has to equip himself at least with the complete training of high school. A youngster doesn't need very much applied math or applied science to get the message that there really is some use for math and science out there in the real world. An early program in industrial arts can be one of our biggest safeguards against dropouts. Just let a youngster in the 7th grade who's not motivated towards college get a little feel of what a welder does, what a machinist does, get a little experience of his own, and you've given him a real introduction to some of the good things he can make out of his own life."



work and study for "functional living"

warren, ohio

School leaders of Warren, Ohio, an industrial city of 60,000, were confronted a few years ago by a most unexpected enrollment crisis. One hundred and fifty high school students, earmarked as potential dropouts, had been transferred to an antiquated school building for an unusual 1-year program of occupational training. They were all in the lowest 7 percent of academic achievement and seemed bound to leave school almost illiterate, preconditioned to defeat and psychologically disoriented. The program was a last-ditch attempt to save them from the ranks of the hard-core unemployed.

Another year for school dropouts

The enrollment "crisis" came the following September. Almost all of the students, instead of dropping out, showed up. They wanted another year of school.

This 3-year stopgap program has since flourished into an extraordinary 6-year curriculum, extending from the 7th to the 12th grades. It combines an unorthodox academic program with practical work in the school shop and on a school-owned farm. This practical work leads to part-time employment during the 11th and 12th grades for pay as well as school credit. In a recent school year, working students not only earned an average of more than $700, but had built bank savings accounts averaging $400. Warren's dropout rate was reduced from 5.69 percent in 1959 to 4.87, 3.64, 2.95, 2.25, and 2.02 percent in successive years. Students whose experience includes the part-time work program are, without exception, moving directly into full-time jobs upon graduation.

Pleasing as these achievements may be, the most surprising results to their teachers are changes in students' motivation, occupational outlook, and personal behavior.

When the Warren occupational training program began in 1960, its aims were modest and not sharply defined. The Warren school board had received a superintendent's report of a 5-year survey to measure the postgraduation success of vocational students. The survey had shown a remarkable correlation between vocational success and scores earned many years earlier by junior high school students in aptitude tests for vocational training. As a result of this survey, Dr. Sanford F. Jameson, superintendent of schools, made a series of recommendations to the board of education: (1) A determined effort should be made to guide a higher quality of student into vocational education; (2) instead of continuing to consider vocational education as a "dumping ground" for academic misfits, the regular vocational program should accept only those whose test scores indicate a chance for success; and (3) *for less able children, a new kind of occupational training program should be designed,*

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suited to their abilities and interests as well as to the practical requirements of relatively unskilled unemployment.

The emphasis in this occupational training program for less able students would be on industrial arts and home economics, development of simple work disciplines rather than skills, and social attitudes to make a youngster a better member of his work group, community, and family. Also, special effort would be directed at remedial instruction in reading, writing, arithmetic, and elementary social studies. To be selected for this slow-learner program, a pupil would have a Binet score of less than 80, be 3 or more years behind in reading, and 2 years or more behind in arithmetic. In addition, his 6th-grade teacher would have to predict that the child would have little probability of success in Track III (the slow track) in the 7th grade.

Design for a new vocational program

The board further decided to remodel an old building, the Market Street School, to house the program. They wanted to test a notion that the children might be less harmed psychologically if segregated from normally bright students than they would be by the daily experience of failure and feeling left out among brighter schoolmates.

The number of 6th graders qualifying for the new program came to only 44. This number hardly justified opening and staffing a separate building. School officials decided to triple the enrollment by starting simultaneously with 7th-, 8th-, and 9th-grade classes.

During the first few weeks, the problems portending failure far outnumbered the prospects of success.

"We had children and a building, but no real idea of what to do with them," recalls Michael Zockle, one of the teachers originally assigned to the program. "We had some textbooks, elementary readers and multilevel spelling and math books. But we knew that books were not the answer. We had a few incorrigible youngsters who had to be weeded out. This was a school of slow learners, not incorrigibles. Also, we found right away that we had a stigma. Teachers in other schools had a new way of threatening kids. They'd say, 'If you don't behave, I'll send you to Market Street.' Or one teacher would say to another, 'I've got a child in my class who's real Market material.' In those first few weeks, one boy told me, 'When I go home from school, I run through the back alleys so people won't know where I'm coming from.' Of the teachers at Market, only two of us volunteered. All the rest were new to the Warren school system, some fresh out of teachers college."

No building or textbooks for children

In the absence of published curriculum materials for slow learners, informality in instruction reigned, accompanied by

experimentation and, indeed, no small amount of fumbling. No two teachers taught—or for that matter, fumbled—in the same way.

"I began to use newspapers for a textbook," says Mr. Zockle. "These youngsters, who are very slow and supposedly couldn't read, *did* read news that interested them. At times we had more intelligent discussions than I'd expect to have with some adults who read well. When the announcement came out that General Motors had decided to build a Fisher Body and Chevrolet assembly plant here that would employ 5,900 people, these kids were really interested. We talked about what people would do there, how GM would find employees, and what qualifications and habits the job applicants would need to have. We even talked about the importance of certain questions in a job application. Then I got some standard job application forms, and the youngsters were very interested in filling them out."

"They're also interested in politics, mainly because they can argue. During the election, we had lots of discussions about how to decide whom to vote for. We studied a pamphlet put out by the League of Women Voters on the background of each candidate, then had an election right in the classroom. The students became interested in how the town council works. Pretty soon, they began taking turns attending town council meetings and reporting on them to the class. Then the whole class would argue about town issues. After each discussion, if their interest was really high, I'd assign a written composition on the issue."

Personal problems on a decision-tree

"As much class discussion as possible was based on problem solving instead of trying to get them to memorize facts. This was even true of personal problems, and the youngsters had plenty of them. Many of these were handled by individual counseling. If a kid had a problem or a question, we tried to make him feel free to come into the office and talk it over. Pretty soon we found that often they didn't mind bringing a personal problem into the open for class discussion. Maybe this was because all the others had similar problems, and all of them knew it. I remember one boy who wanted to leave home because his mother, a divorcee, was carrying on. Of course, he wasn't satisfied with my advice that he stay. He wanted to talk about it in class. Se we had what we called a brainstorming session. That's when everybody was allowed his say, no matter what. This led to what we began to call 'hanging a decision tree.' We'd list all the benefits of leaving home—marking each on a separate slip of paper—and hang them on the branches of one side of the tree. Then we'd hang all the benefits of staying home on the other side. And we'd see which way the tree seemed to bend. We had once seen

that technique in a movie on decisionmaking. It seemed to impress the youngsters, so we kept it as a class technique."

"We didn't know quite how or when it began to happen, but this kind of schoolwork—without prescribed books, without memorizing, with hardly any formal instruction—began to get to them. School began to be important. It had something to do with their real lives. We didn't realize how much this was happening until we checked around to see who was coming back to school. Practically all the kids old enough to quit said they planned to come back—and they did. Whenever we'd ask a student why, he'd say, 'Well, I think I'm learning something here.' "

Fixing up the old barn

Something else happened that year which, although no one realized it at the time, was to have a profound effect on the direction of the Warren program. A large tract of land 10 miles from Warren, formerly a portion of a U.S. Air Force base, became available as Government surplus. It was offered to any nonprofit organization in the county that would put it to use for the public good. Mr. Dunton drew up a proposal for using the tract in agricultural education, especially for slow learning children. The proposal led to an award of the land.

Mr. Dunton's interest in the land was not based purely on the happenstance of its availability. He also was motivated by a incident almost 20 years earlier. During World War II, his son, then entering high school, was having reading difficulties.

"He knew he had to read better to be eligible for the football team," Mr. Dunton recalls. "The only thing he was interested in besides football was agriculture. We got him a little tractor. To maintain it he had to read a manual, figure out how many pounds of torque you put on a certain bolt, and things like that. Believe me, he learned to read. Well, he not only made the football team, he went on to 7 years of college. He's now a veterinarian, taking his master's degree at the University of Michigan. I learned from him that a child will learn to read if he's interested in what he's reading about."

Mr. Zockle welcomed the idea of a school farm. "It was pretty tough keeping a bunch of boys in class all day when we had inadequate gym facilities and only a modified physical education program," he recalls. "One day I took them all out to the farm in a school bus. There was an old barn, a dilapidated shed, and 76 acres of trash and scrub. I said to the boys, 'Now, I know you're not really interested in this mess, but maybe we could do something to fix it up for your younger brothers and sisters and even for your kids.' Some of them laughed it off. I said, 'O.K., if you don't want to do this, you can sit down and watch.' Now, if I had laid out a plan and told them all what to do, they wouldn't have done it because that would have been

work. I just asked, 'If this place was yours, what would you do to fix up this old house?' They came up with lots of ideas. The main one was that the ceiling was too low. I asked, 'How are you going to raise the ceiling?' They took all the ceiling joists out, raised them, and put them back in again. The new appearance gave them a real pride. Then I asked, 'What are you going to do about the outside?' One boy pointed out a home down the street that had 'some kind of cement' on the outside. 'Do you think it would look good on this?' They thought it would, so we stuccoed the building. 'Now, what else would make it look better?' Someone suggested shutters. So they built shutters, then made a kind of cupola for the roof. And we wound up paneling the inside."

"We had no budget for any of this, but maybe that was a good thing. The kids learned to think about how to use materials at hand. Some of it was Government surplus. Then they got the idea of tearing down other buildings that were eyesores and reusing the lumber. We put up some makeshift lights operated by a gasoline generator that we got from surplus. For a gas tank, the kids adapted an old oil can and connected it by soldering a copper pipe. All this gave them a feeling of ability. Also, it helped me learn about them. In training slow learners, you give a kid a simple task that you know he can do. When he does that, you give him a more challenging one. You keep on doing that until you find his peak."

"Some of the parents complained that we were exploiting their kids for the benefit of the board of education. They didn't see the farmwork as an educational experience. We got the idea of calling it a course in planning and construction. Just giving it a name changed the parents' attitude."

Greenhouse, gardens, and shops

"The following year, the schools employed a young agricultural teacher to take charge of the farm. Before long, the farm had a greenhouse and extensive gardening areas, which have become an important part of the practical-work phase of the special program for junior high schools. Students not interested in the farm do shopwork in wood and metal back at the school. Girls do practical work in home economics."

"A year after the first enrollment crisis—when 9th graders old enough to drop out stayed for the 10th grade—it became clear that another crisis was coming. The students evidently were planning to enter the 11th grade, and there was no guarantee they wouldn't still be around for the 12th. What were they to be taught? If the new goal of their schooling was to prepare them for stability in relatively simple jobs, what better places to train them than in a real job?"

Training for a real job with pay

Warren school officials consulted with the State director of vocational education to get financial support for a work-study program. Ohio regulations permitted State support for students in advanced vocational courses, but not for lower level occupational training. Traditional thought had always held that people don't have to be trained to become waitresses, busboys, gas station attendants, and farmhands. "But," Mr. Zockle points out, "a slow learner has trouble remembering simple duties. If he's told to dust the desk, he'll do it, but he won't think of looking for dirt on the floor and he'll forget the windows. The training he needs isn't for skill but for the simple kind of thinking that goes into a simple job."

There were State funds available, however, for pilot projects. By attaching the label "pilot project" to his new work-study program for slow learners, Mr. Dunton obtained approval for going ahead.

Mr. Zockle was appointed coordinator of occupational training. It was decided that classes should be small—no more than 18—for students with part-time jobs. They would spend half a day in class and half a day working. While the boys worked, their teacher—or "job coordinator"—made employer contacts and counseled with students and parents.

Working closely with E. Paul Shork, associate professor of trade and industrial education at Kent State University, (Mr. Zockle and his fellow teacher-coordinator, John Stocz) developed a plan of action for getting jobs. They sent letters and visited employers and public institutions all over the city.

"We gave them all our reasons for believing the youngsters would do a good job," says Mr. Zockle. "Some employers weren't ready to take the risk, others were. We didn't push anyone. We made sure they understood they were part of a vocational training program. This meant patiently working to find the peak of a student's ability, not expecting too much nor asking too little. The only thing we asked the employer to promise was not to fire a youngster without consulting us first. The kids have had enough failures. We've got to build on successes. As they become more successful, we can slowly start to criticize their work with the objective of improvement. We don't want them to graduate feeling they do everything right and nothing wrong—but we don't want them to keep on believing the opposite either. Also, an important part of this was counseling with parents to get them to understand what we were trying to accomplish. We had to coach a lot of them on how to encourage a youngster without demanding too much."

The campaign succeeded in obtaining jobs in stores, restaurants, filling stations, machine shops. Hospitals became the

biggest employers, putting boys and girls to work in kitchens, laundries, as custodial help, and carrying food trays to patients. Such service establishments seemed to be the most ready source of jobs. This was taken as a good omen, for service jobs are the most rapidly growing kind in the economy.

"We suggested to employers," said Mr. Dunton, "that they start the beginners at 75 cents an hour and raise them 5 cents every semester, so by the time they graduate they're getting $1. We've got young people getting $1, $1.50, and $1.75. Employers raised them voluntarily because the kids are worth it."

Learning to save

"This created a problem. Many of these youngsters are from families on relief or Aid to Dependent Children, some for the second or third generation. The handicaps of poverty are inherited, you know. Well, the relief administrators began raising questions as to whether or not a family remained eligible when their children were earning money. The job coordinators went to work on it. They got a ruling from Columbus, the State capital, that a family wouldn't have to get off relief if we had a savings program. The youngsters could keep $7 a week, and the rest of it had to go into a controlled savings account."

Actually, a savings program as part of the curriculum was already underway, the result of an unusual influence of a parent. The stepmother of one boy had been distressed at seeing him fritter away his earnings. She threatened that if he didn't open a bank account, he'd have to start paying board at home. This prompted Mr. Zockle and Mr. Stocz to get other parents to encourage saving.

"We began by having class discussions on how the youngsters spent their money," says Mr. Zockle. "We'd put their budgets on the blackboard and talk about them. We listed the necessities—shoes, clothing, food, recreation—and added up what they cost. They were surprised to find they were spending too much for nonessentials. We agreed that, among juniors, boys should spend about $7 a week, girls about $4.50. Senior boys should have $9, girls about $6. The remainder would be placed in a bank. Then we agreed that no one would take money out without coming to class and discussing it first. The kids and their parents signed an agreement. It's not mandatory, just a pledge. At the end of our agreement form we say that if a student doesn't save, we may not seek his raise in pay. After all, if we arrange for them to earn money without teaching them to spend wisely and save, we're encouraging them to be spendthrifts."

The savings program had some unexpected side benefits. One boy from a broken home—he was living with his father—is

described by Mr. Zockle as having been painfully shy, ashamed that his appearance was poor because many of his teeth were missing. The boy was employed by a service station where his pay rose steadily to $1.75 an hour. His rigorous budget soon enabled him to pay $400 for dental care. "Once he got his teeth," says Mr. Zockle, "he was a changed individual. He opened up and began to enjoy being liked by his customers. His self-estimation now is, if anything, higher than it ought to be."

Another lad had been working successfully as a restaurant busboy and saved dutifully. During the summer before his senior year, he called Mr. Zockle at home and said remorsefully, "I know you're not going to like this, but I withdrew $500."

"It's a fine thing to be consulting me *after* you've withdrawn," Mr. Zockle said.

"Well, I didn't exactly spend it," said the boy, changing his tone to reveal a pleasant surprise, "I invested it in blue chip stocks."

Mr. Zockle knew that the boy was getting some good investment coaching from lawyers who had befriended him in the restaurant. During the first week of school, Mr. Zockle had the boy bring his stock certificates to class and led a lively discussion about stocks, Wall Street, and how corporations financed growth through the savings of many ordinary people.

Adjusting to the job

One boy's difficulty in saving has been turned into a useful experience for his classmates. This lad, an exceedingly slow worker, had difficulty adjusting to a series of jobs. Finally, he landed at a gas station where he showed some mechanical inclination. Soon, it was decided to test him on a better job with an employer who repaired auto transmissions. The boy became exceedingly interested and a valuable worker. After starting him at 75 cents an hour, his employer raised the wage every 3 months until he was earning $2.50, the highest of anyone in the class. Perhaps overexhuberant at this success, the boy married. Before a year went by, he was the father of a premature baby that required 6 weeks in an incubator. With no insurance, the young couple faced mounting hospital bills. About 6 months later, the young father's earnings caught up with the bills.

"The boys were interested in his problems," says Mr. Zockle. "We first asked if he'd mind our talking about them in class. He said, 'Fine, if it would help the others.' We discussed how much easier it would have been if he had had hospital insurance. Then we had an insurance man come in and talk about different kinds of policies. We talked about car insurance and every other kind and raised questions as to which were necessary and which were not."

"Once education is based on functional living, these youngsters get involved, and they want to learn. If I take up something in class that doesn't get them involved, I drop it. But the more real-life the subject matter is, the more they drink it up. In classroom discussions, we talk about bank interest, mortgages, passbook loans, installment buying. If we can involve a student's experience, it's even better. One day a boy said in class that he wanted to change his budget so he could buy a motorcycle to get to his job. It would cost $450. A dealer had told him he could have it for only $34 a month. I asked how long he'd have to pay for it. 'Three years,' the boy said. I suggested that we all do a little arithmetic. We multiplied 34 times 36. The boy looked at his piece of paper and was amazed. 'Twelve hundred and twenty-four dollars? I thought that man was giving me a deal.' One of the other boys said, as though he'd known the right answers all his life, 'You better start figuring things out'."

Mr. Dunton's favorite illustration of Mr. Zockle's impromptu discussions occurred one morning when one of the boys had just received his first paycheck. It was 8 cents smaller than the boy expected. Oddly, the boy saw a notation of 8 cents under a heading "F.O.A.B." Mr. Zockle explained that the letters stood for "Federal Old Age Benefits." As Mr. Dunton tells it, "That class ended up spending better than a week talking about social security, unemployment insurance, Franklin Roosevelt, the New Deal, the depression, things that never could have been taught these children as part of a course outline."

Man must learn to work

Not all of the education is based on talk. When interest is high, Mr. Zockle siphons the enthusiasm into reading and writing. Recently, the citizens of Warren were caught up in a controversy over whether to tear down some historic landmarks to make room for office buildings. After determining that his students were interested in the controversy, Mr. Zockle assigned the reading of an article on preserving landmarks. It appeared in *Changing Times* magazine. Despite their supposedly low level of reading skill, the students read the article with high interest and apparently good comprehension. The reading was followed by a stormy discussion in which some argued for the important sentimental values of saving old buildings, while others insisted persuasively that sentiment should not stand in the way of progress. When such a discussion is lively—as this one certainly was—Mr. Zockle assigns the writing of a paper in which the student presents his point of view. At first, Mr. Zockle reacts to the paper purely on its content and forcefulness of expression—not on grammar, spelling, or punctuation. He believes that these technical matters should not inhibit the development of a student's freedom in expression. Then he discusses the importance

of accuracy of language as an aid to expression, and provides drill in the technicalities.

Some of the products are quite remarkable, considering the conventional teacher's view of what can be expected from a "slow learner" with an IQ of, say, 75. Recently, after a heated discussion about values that a man ought to live by, Mr. Zockle picked up a running theme and assigned a paper to be titled "Man Does Not Live By Bread Alone." One 19-year-old student wrote:

"Man must have other things besides bread. He has to have something to go along with bread. One thing I think all men must have is love. Love for something or someone. Man should have some entertainment to take his mind off of his everyday life to keep him happy. Man must have some hobbies or job to keep his hands doing something and to show that he can do something besides nothing. Man may want a wife and children but some men just rather stay single and they are both happy this way. There are many things man must have besides bread. It takes a lot to keep a man going. I know people that like to have nice clothes, nice homes, nice cars, nice families. They like to have everything nice but don't like to work for what they want. These people are trying to live by bread alone. This will never work out because man must work for what he wants. Even though he has everything he still must do something besides live."

That was not the first version of the paper. Mr. Zockle usually turns the first version back to the student, saying, "That's fine. Now let's start each sentence with a capital letter." Then he may turn it back again, saying, "Let's put a period at the end of every sentence." He feels it's important to take one step at a time, so students do not become confused and overwhelmed at the demands of the language. One advanced version of a paper about a boy's job—a favorite subject for writing—was turned in as follows by a student with an IQ of 55:

"I'm going to tell you about my job and what it's like. I work at the Warren city schools as a custodial helper. My job is to help the janitor inside the school. I work 3 hours a day. To do this kind of work you must be healthy and strong. If you were not, you wouldn't be able to carry heavy box or cleaning tool upstair or downstair. The janitors at the school name is Mr. Green. Mr. Green first started me in two rooms. When I first started on classroom, I didn't know how to start. Then later I learned more about how to go about doing it. Now I can do it like nothing to it."

Bringing out the best

How fairly do the IQ scores of the authors of those papers reveal their potential?

"Those youngsters have been improperly evaluated," says Wiley S. Garrett, Warren's assistant superintendent for curriculum and instruction, "and it might never be discovered without a program like this. You can take an extreme *educational* retardate, give him the Binet—all the tests you want to give him—and he'll act exactly like a true *mental* retardate. But in a program like this, somewhere you find this youngster has a trait that is way above the average for his total pattern. Then you start becoming suspicious. One of the best places to put an educational retardate, once you discover him, is in a program like this to get him on the beam, to find his strong traits and build on them. That's why we're finding a few terrific jumps in IQ—of 20, 30, 40 points—in youngsters as old as 15, after they've been in this program for a while. What has happened is that often a youngster's IQ has been used to misclassify and misjudge him."

If IQ's often misjudge these students, their fellow students seldom do.

"Mr. Stocz and I," says Mr. Zockle, "each year go through a list of prospective students for the cooperative work-training program. We draw up a list of 10th graders who we think are ready for jobs. Then separately, Mr. Stocz in his class and I in mine, ask our students, 'Out of the 10th graders you know, which would you choose to become members of cooperative occupational training?' Their lists are almost always identical with the one we drew up. They know the ones who will really try and the ones who will give us problems."

"You can just see the change in their sense of responsibility," comments Mr. Dunton. "Teachers at Market School brag about hall behavior compared to what they've seen in other Warren schools. During the first year, whenever I'd stand in the hall at dismissal time, I'd see these youngsters walk by with their heads down. By the third year, they walked with their heads up, and if you'd halfway start to smile they'd beat you to it. They're enjoying opportunities they never had in other schools where they were the slowest students. At Market, they have a student council. They put out a yearbook. They have an annual banquet for the Future Farmers of America and a banquet for the employers of the ones who work. They have a drum and bugle corps, a good one. These youngsters couldn't have regular music in a regular school. If they couldn't read a book, nobody was going to try teaching them to read music. You should see how proud that drum and bugle corps looks when they're all fixed up in their bright uniforms. They have their own basketball team. They could never have played basketball in another school where they'd be behind in their studies. Last year, the team broke even. This year, their record is 13–2, and they'll probably be in the championship tournament.

"These youngsters may be slow learners, but there's one thing they can pick up quicker than others—any hint of condescension on the part of a teacher. For years, in other schools, teachers have shoved them in the back of the room and looked down their noses at them. The youngsters become skilled at spotting this. Now, if you rated school teachers in any school in America, you'd come up with something like a normal curve. But in our first couple of years, if you rated the teachers at Market, you'd have a curve skewed at both ends. Teachers either succeeded or they failed. There wasn't an average teacher in that building. We don't yet know why. Instead of transferring teachers from other schools, we began bringing in outsiders who showed a special interest in this kind of program. That helped us build the fine set of teachers we now have."

Along with the early problem of building staff, the school had the simultaneous problem of making parents agree that their children needed to go to a special school. "In the program's second year," said Mr. Dunton, "our superintendent decided that it wouldn't do to leave the option of transfer to parents. He exercised one of the legal powers he has according to Ohio law, that of assigning children. Four families raised a fuss, and one even moved out of town to avoid the transfer. We pleaded with that family, pointing out that their 9th-grade child had had years of the best instruction we could give him, but he still couldn't read. Next year, that child's parents came back and asked if we would accept him at Market, which, we did."

Successful as the Warren program may be, it is not without opposition among some special and vocational educators around Ohio. They resisted isolating slow-learning youngsters in a separate building. That misgiving, in fact, was Warren's main hurdle in getting high school accreditation for the Market Street School and in obtaining a permanent commitment from the State for financial support with vocational education funds.

"Each year," says Mr. Garrett, "we had to submit an evaluation report covering such things as attendance, how many youngsters were called into the office, how many appeared in court, evidences of participation in school activities. Practically none of these slow learners took part in activities in their old, regular schools. The dramatic difference in the way they participated at Market was, I think, one of the important things that convinced the State department of education."

Mr. Dunton adds, "I think one of the convincers was when we sat down with them and said, 'We're going to go ahead with this program whether you reimburse us or not.' "

In the fall of 1964, the Market Street School was given its charter. In June 1965, something happened which no one dared dream 5 years earlier when the school was opened as a final

way station for junior high school students enroute to dropping out. It had a full-fledged high school graduation exercise.

Mrs. Mary Jane Taylor, Warren school board president, and an enthusiastic supporter of the Market Street program, glows as she recalls the ceremony: "They had an organ to play the processional, and all the youngsters sat on stage. We offered to furnish them robes, but they voted that they wanted dressy white dresses and dark suits. One of the boys gave a speech. He told how when he first went to school he had not known what success in schoolwork was. He'd always been at the bottom of the heap. He was very leery of Market Street at the beginning, and he told about these doubts. Then he told about his success and what it meant to him, about the school's activities, and how, when he got into the 11th grade, he was able to go out and get a job. He was graduating with $1,700 in the bank, earned as a short-order cook. And he told how, with his adviser's approval, he had bought a secondhand car and rebuilt it. As I was sitting there, I could see his mother and dad. They had such a look of pride in their youngster. I went up to them afterward. The boy's mother grabbed me and hugged me and said, 'Do you know what this day means to us?' I said, 'I'm trying to, and I think I do.'"

a plan for para-medical training

phoenix, arizona

In Phoenix, Ariz., as in many fast-growing cities, the number of sick people in hospitals is growing more rapidly than the number trained to care for them. To keep up with population growth alone, the city needs to add 700 nurses and technicians each year for hospitals, doctors' offices, and laboratories. It is training hardly half that many. The shortage is intensified by the advent of medicare and new advances in medical technology and hospital organization. Meanwhile, the cost of training nurses and medical technicians has skyrocketed. These rising education costs are chiefly borne by hospitals which must recapture them through patients' fees. Thus each year, across America, while good care is jeopardized, the financial burden on the sick grows more heavy.

A paramedical training center needed

Phoenix has faced up to its crisis by developing a plan for a paramedical training center to integrate and conduct the education of almost every kind of doctor's assistant from registered nurse down to hospital orderly. The center might well serve as a model to the Nation. Although it is still in a formative stage, the story of its early planning is a valuable case study of how diverse community forces joined in a bold and imaginative innovation in vocational training.

The venture originated as a definition of a problem that was formulated a dozen years earlier in the mind of Stephen M. Morris, administrator of Good Samaritan Hospital. While still in training, Mr. Morris had done a thesis on the expense to hospitals of training their employees.

"I began to find out," he says, "that, while the cost of patient care was going up, a hospital's education costs were climbing still higher proportionately. The first question I asked was how much longer private hospitals could continue to spend increasing amounts of money for education. Next I asked why hospitals, and ultimately patients, should carry this burden when other professionals—lawyers, engineers and teachers, as well as doctors—are principally trained in State universities and other public institutions. Hospitals train perhaps 75 percent of the country's RN's. Even after deducting the value of a student nurse's practical work, her education costs a hospital something like $2,500 over what the student contributes in tuition. Then, in more than half the cases, the hospital doesn't hold that nurse. One out of four drops out before getting licensed. Of the three that graduate, one never goes to work as a nurse. Of the remaining two, many go to work in private hospitals, doctors' offices, or in schools or industry. So the attrition rate is very high. And all this adds up to cost for the hospital—and the sick are the ones who pay for it."

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Higher costs for medical education

Mr. Morris recently calculated that a patient at Good Samaritan pays $2 a day for education of nurses and technicians. In other hospitals, the education cost runs as high as $6 per patient daily.

"Finally," continues Mr. Morris, "I began to ask why all this couldn't be integrated into our country's basic educational structure. Why shouldn't high schools, junior colleges, and 4-year colleges conduct the academic courses in cooperation with hospitals that would provide the clinical training? A hospital has to be the clinical workshop. But certainly the theory and academic work could be handled at least as well in an academic environment."

The training problem and its cost have increased sharply as hospital job categories have grown more specialized. Until recently, virtually any skilled hospital task not performed by a doctor was handled by a registered nurse. The shortage of nurses, however, forced a reexamination of duty assignments and led to the creation of specialized technical skills.

"Take the electrocardiogram, for example," says Dr. Paul Singer, a staff physician at Good Samaritan as well as a former State senator. "The doctor used to handle it when it first came out. Then we'd instruct the nurse how to place the probes.

When nurses got busier, we found you could teach it to someone who wasn't a nurse. How did we start on inhalation therapy? Well, we hired some people off the street and trained 10 therapists right here, because there wasn't any other way to do it. It's become a real specialized area now with the development of resuscitators and all of these other new electronic machines.

There's a whole new approach to the heart program. We've got technicians now who are trained by recordings in the sounds of the heart. We never thought about any such thing 5 years ago. The surgical assistant, trained in another subspecialty, has to know anatomy and be adept in assisting, but doesn't have to be a R.N. There was no such thing as a ward clerk when I went to medical school. Now clerks do written work that nurses used to do. They have to be familiar with terms and have a good idea of just what goes on. Mr. Morris has now started a secretarial school here at the hospital. The students transcribe from medical dictation. Of course, they, too, must be familiar with terms and some of the processes."

"One way or another, we're getting all this done, but it's most inefficient. Every hospital that goes into an inhalation therapy program has to train its own people. We train two or three X-ray technicians and St. Joseph's Hospital trains two or three for itself. One of our departments will train lab technicians, and over there they'll train a physiotherapist. Yet training for all of these specialists has certain basic requirements in

common. Whether they're electroencephalographers or lab technicians, the specialists have to study, for example, a modicum of anatomy."

A new curriculum for medical specialized skills

"We began to envision a program," adds Mr. Morris, "for amalgamating training of a dozen or more kinds of specialists, including nurses, licensed practical nurses, nurse's aides and orderlies, as well as such technical specialists as electroencephalogram technicians, inhalation therapists, physical therapists, and so forth. We thought of devising a basic curriculum to cover what was common to all of the medical specialists, so we could teach the students more efficiently before they branched off into their separate fields. It's a great waste to deliver the same anatomy lecture to 6 separate groups of 8 people, instead of to one group of 48."

"After all," comments Dr. Singer, "a combined lecture works in medical school. Everybody there has to take anatomy whether he's going to be a psychiatrist or a foot doctor. So they all take it together. Why can't we do the same things in paramedical education? And the best part of it is that once a way to integrate this basic education has been devised, the hospital doesn't really have to do it at all. It could be handled by professional educators in a school. We don't want to run a school in anatomy. Steve Morris doesn't want to run a secretarial school or an X-ray or a lab school. On the other hand, we can do what a school can't. We can provide the practical, inservice training, working with patients on a hospital floor."

Upgrading duties for better service

"There's another big advantage to integrating basic paramedical education. It fits in with the strong trend towards upgrading everybody's duties. Right now, the training we give a hospital aide is pretty well terminal. If she wants later to become a licensed practical nurse, she has to go back and start at the bottom. The same thing with the licensed practical nurse who might decide after she starts, 'Well, maybe I want to be a registered nurse.' If basic courses are properly accredited, a girl can work towards a 2-year certificate, then even go on toward a 4-year degree without having to go back and start all over again. This saves time and money for both her and the hospital, and we have a more skilled person that much faster."

"All of this would not necessarily be on a post-high-school level. Some could be technical-vocational courses for high school credit. Right now, the concept of an aide is someone with a high school education. Orderlies and ward clerks could get all their academic training through courses for high school credit. The important thing here—and this is where we feel we're truly pioneering—is in thinking of a curriculum study.

We have to be sure that we devise a curriculum that is accurate and adequate, yet not too prolific for any particular specialty. It's got to be universal for paramedical people, but very efficient."

Plans for the training center

All of this was a definition of need. Before it could become a plan of action, much had to be studied, many people involved. The first person Mr. Morris sought to involve was an accomplished administrator and researcher, Dr. Arthur M. Lee.

Dr. Lee, a former professor of history and political science, had recently been executive secretary to Gov. Paul J. Fannin until the Governor became a member of the U.S. Senate. His personal acquaintance with key leaders throughout the city and State was unexcelled.

The Good Samaritan Hospital retained Dr. Lee to make a complete survey of paramedical education in the State—how many students were preparing for what occupations, when they would be expected to graduate, and their expected attrition rate. Dr. Lee quickly learned that the State Employment Service had been conducting a related survey of job openings in 16 paramedical categories for the ensuing 5 years. A comparison of the two surveys dramatized how the preparation of people was falling far behind the need for such people.

Dr. Lee also was charged with finding out what Federal and foundation programs might be of assistance in launching a Phoenix training center. He set out on a national tour, financed by the hospital, visiting the American Hospital Association, the U.S. Public Health Service in Washington, and several foundations. From the Kellogg Foundation at Battle Creek, Mich., he learned of local experimental efforts in Pittsburgh, Pa., Winston-Salem, N.C., and Springfield, Mass., to train paramedical personnel. He visited those.

As a first major step in launching the Phoenix effort, Dr. Lee organized a meeting in May 1965, to consider the formation of the Arizona Health Services Education Association (AHSEA). The people invited to attend this meeting were carefully chosen from every major community element related to health and education—each a source not only of help but of potential resistance. Enlisting them was not accomplished without difficulty.

"We decided," Dr. Lee recalls, "that we wanted four representatives of the Hospital Development Association, a voluntary fund-raising agency, plus the administrators of the city's four major hospitals. We also asked the local medical society to designate a member. Their president selected Dr. Singer, who had already been active at the hospital in getting this thing going.

When word about the plan got around among the doctors, however, some of them had reservations. They thought it might disturb the traditional training of nurses and orderlies. You'd be surprised how people don't understand what is involved in education, especially doctors who are so busy practicing. Also, I think some of them were disturbed when they read in the paper that we might apply to foundations or to the Government for a planning grant. They felt we were stirring up something that affected them, but they didn't understand how. They didn't like the idea of an outside agency. Well, Dr. Singer requested an opportunity to present the case at the medical society's next board meeting. He and I went together, and we spent the whole evening discussing how the personnel need was growing and how few people were actually in training. It seemed some of them did not know these facts before. When we were through, they passed a resolution endorsing AHSEA 100 percent."

"I anticipated resistance from several sources where I didn't really find it. What I did find, however, was apathy. We felt it essential to get the active participation of our three major educational institutions—the Phoenix Union High School District, the Maricopa County Junior College District, and Arizona State University. Each was separately involved in some form of paramedical education. We decided at the beginning we needed the top people from all three to make sure that our board had decisionmaking power. Howard C. Seymour, the high school district superintendent, came right along with us. When I approached Robert J. Hannelly, president of the junior college district, he said he just couldn't take another job. He offered to send his director of technical education to serve on our board. I said, 'Bob, we've just got to have you. If you send a staff member, others are going to think they can do the same thing. We'd be down to the level of having to go through channels for every decision.' So he agreed, and he's since been one of our most active members."

"Arizona State University's president, G. Homer Durham, also said, 'I just haven't the time.' Paul Singer tried to change his mind and couldn't. So I went to the chairman of the State Board of Regents, O. D. Miller. I described what we are doing and said we have to have Dr. Durham on this board. Mr. Miller agreed that we needed the university's participation, and together we were able to convince the president."

Other board members included the State and county health commissioners, the State director of vocational education, the administrator of the State Employment Service, as well as Dr. Lee.

Even after organizing these men of diverse interests into a single board, Dr. Lee anticipated conflicts and resistance. But his care in involving them as partners was apparently responsible for warding off expected difficulties.

"I would have expected," says Dr. Lee, "that some of the hospitals would be reluctant to join in this kind of relationship with Good Samaritan. They are competitors for personnel as well as in other ways. I didn't know how well a public hospital like County Hospital would work with private hospitals. I knew, too, that Arizona State is expanding its own programs along distinctly baccalaureate lines. Meanwhile, the junior college is just now opening up new responsibilities of its own, instead of merely continuing in the traditional role of a feeder institution for the university. Also, each has a different kind of nursing program, and they are competing. The junior college's is 2 years, the university's four years, although each leads to a R.N. Yet I didn't find resistance. I think it was because I was dealing with the top officials. It's their staff members who sometimes got caught up in rivalries."

The project then moved ahead by the twin engines of the board's harmonious determination and Dr. Lee's ingenuity in taking advantage of funding opportunities. Through a previous grant, he had already established an organizational structure that was useful in seeking support for the paramedical project. Some months earlier, when Dr. Lee had just left his post in the governor's office, he had a conversation with J. R. Cullison, State director of vocational education. Through the governor's active interest in vocational education and Dr. Lee's background in research, Dr. Lee had become aware of a crying State need. "If I were to become active in vocational education research," Dr. Lee asked Mr. Cullison, "what task would be of most help?" Mr. Cullison readily replied, "What we need most is to find ways of establishing some liaison between vocational educators and the industrial segment of our community." Dr. Lee designed a proposal for a research development project to involve leading educational and economic groups in the State. It resulted in a $100,000 grant under the Vocational Education Act of 1963 to Northern Arizona University for an 18-month project employing Dr. Lee as director.

Through the structure of this project, called "The Arizona Occupational Research Coordinating Unit," Dr. Lee applied to the U.S. Office of Education, Division of Adult and Vocational Research, for a $60,000 grant to conduct a research study for developing a curriculum for paramedical education. The grant was made in June 1966. A previous grant of $20,000 had been obtained in December 1965, from Educational Facilities Laboratories, Inc., to initiate studies for the design of a building which might house a paramedical education center.

As "ready to go" as the project may appear, some of its most important problems are as yet unsolved. "One of the big problems," says Dr. Singer, "is just who should run this center. This is really an uncharted sea. We have no illusions that the

center as such is going to give a degree of any kind, nor for that matter do we want it to. Whoever operates this facility will be a degree-granting institution. What I hope is that all three of our public educational institutions will run the center in some kind of a cooperative arrangement. The best arrangement would be one in which work taken, say, at the junior college would be not only transferable, but would actually be considered credit by the university towards an appropriate paramedical degree. For example, we might train a lab assistant, and he might get, say, 20 credits. Then if he wants to go and get 120 credits toward a university degree, he'd have the 20 to build on. No matter what form the cooperation of these schools takes, I envision this as a kind of medical school, either under the existing institutions or, with its own board, directly under the State superintendent of public instruction. We could even charge tuition if necessary to make it fairly self-sustaining."

Dr. Lee agrees that this remains the "thorniest" problem ahead. But he remains optimistic.

"As we look back," says Dr. Lee, "what we have accomplished so far seems impossible. If we've gone this far with such cooperation and harmony, we'll make the rest work."

realistic training for "families of skills"

quincy, massachusetts

On the village green of Quincy, Mass., there stands a great old colonial church. Behind its gray stone walls, the remains of two American Presidents, Adams the father and Adams the son, are buried. This shrine is the centerpiece of Quincy's proud display of tradition. Tradition exudes from the names of its streets, the monuments in its parks and especially the style of its buildings.

As a visitor stands beside the church on the village green, however, his eye is struck by one sharp break from tradition. About two blocks down a broad avenue, the skeleton of a new building, four stories high, is beginning to be wrapped in modern architectural clothing of glass and shafts of concrete. It will soon open as a schoolhouse, one that will offer modern training in up-to-date vocational skills to students of the 9th to 14th grades. Its interior will challenge the traditions of education as dramatically as its exterior does the surrounding buildings.

Flexible facilities

"When somebody asks us how many classrooms we're going to have, we say four," says Robert E. Pruitt, superintendent of schools. "We have over 200,000 square feet divided into four floors. We're having movable partitions that you can rearrange any way you want, any time you want. If you don't like where they are Friday night, they can be in a different place Monday morning. Where we can avoid the movable walls, we won't have any. Instead of talking about corridors, we talk about aisles. We don't want bricks between the sheet-metal shop and the machine shop, for example, because they don't do it that way in industry. They may be separated only by a painted line on the floor. One way to get an interdisciplinary approach in instruction is to let a student *see* a variety of activities and how they connect. When you break down the walls between them, you may get the math and science teacher talking together, the machine-shop instructor and the sheet-metal man talking together. The pure science labs will be right in the middle of the floor. You may have a machinist teaching his kind of science today and a scientist teaching *his* kind of science tomorrow. But they're both teaching science, and teachers as well as students can see the connection."

"A great portion of the second floor is going to be a library, but hardly anything you'd recognize as a library. We're calling it a materials resource center with a lot of individual study carrels. Some students may come here for remedial reading or remedial math. But it certainly can't be called a remedial study center. Another student who's way ahead of his class will be coming for advanced self-study in some aspect of engineering. One won't be segregated from the other. Each is

learning what he is ready to learn. Our library will be a working area for students, not just a place to store books. A student will sit down with his teacher here or in one of the shop areas and outline a personal program. Then he'll spend time in the resource center pursuing his individual program. He'll meet with his teacher once or twice a week to discuss his personal program. Teachers will staff the center on a rotating basis and will be available to work with individual students."

Lest the reader be misled, this is not a report on the design of a clever new building. As any schoolman knows, education is not built of bricks nor mortar nor the best laid plans of architects. The building is a physical expression of a new philosophy of education that has been developing in Quincy during several long, searching years.

A place for the average student

A few years ago, a State report on vocational education pointed out that only 20 percent of high school graduates entered college with enough serious commitment to finish, although the overwhelming effort of public schools was directed at college preparation. Quincy school officials were shaken by the implications of this study, and they decided to check it out locally. They found their record a little better, but not much better. Less than 30 percent of their graduates were completing college.

"We found," recalls Maurice J. Daly, assistant superintendent for vocational education, "that we were spending about 75 percent of our budget on a kind of education that was designed for a small portion of our young people. What were we doing for the others? Quincy High School, for example, had an enrollment of 1,700. Only about 300 were taking vocational courses. Well, it wasn't hard to see that our curriculum was not in line with the needs of the students."

"First thing we did was organize an Educational Policies Committee made up of Superintendent Pruitt, the three assistant superintendents, the director of guidance, the president of Quincy Junior College, our two high school principals, and our consultant for secondary education. We didn't talk about a new building or new equipment, or anything like that. We asked ourselves, 'What should education be doing for our young people?' We decided, yes, we want a good strong college preparatory program. But, in addition to that, we need an equally strong vocational-technical program. The simple thesis we came up with was that no student should leave secondary school without a salable skill."

"Then we set out to analyze the realities of employment in our area. From the city clerk we got a copy of a local census list-

ing all people over 21 by name, address, and specific occupation—carpenter, sheet metal worker, or whatever. We found that 9 or 10 percent of our citizens are professionals, and 35 percent of all our working population are in trade and industrial jobs. A large remaining number are in service occupations—culinary arts, health services, distribution, transportation, and offices. All this told us something important that we hadn't paid much attention to before. About one-third of our total high school population ought to be preparing for trade and industrial pursuits and a large number for specific service occupations for which there is an immediate demand."

Aptitudes common to different occupations

"At about that time I began drawing some conclusions from my own background and experience, which has been an odd one. I began teaching auto mechanics here in 1940, the beginning of World Wa. II. Then I went into the Navy as a training officer, stationed at Alameda, Calif., where we ran some 20 schools to train about 15,000 people to overhaul aircraft. We had to take people with no skills or unrelated skills and make something new out of them. We began to study what were the basic personal ingredients that lent themselves to certain skills. For example, when we found that we couldn't get woodworking patternmakers, we said, 'You know, if we looked at artists, especially sculptors, we might find some of the skills we need.' So we hired a few sculptors, who didn't have much of their regular work to do during the war, and we trained them to use our hand tools. In a short time, we got them making patterns. But we needed more, and we began to ask, 'Is what we're looking for a dexterity of hands, or is it a certain kind of perception?' We soon discovered that painting artists, who rated high in three-dimensional spatial perception, quickly developed the hand skills we needed. Next, we found that people like actors and actresses seemed to have an aptitude that allowed us to train them as patternmakers and draftsmen. What all this added up to was that there seemed to be certain basic abilities that were transferable from one occupation to another. The particular skills of each occupation might be different, but there were aptitudes in common."

Grouping occupations into "families"

"Later, during the Korean war, I went to work with the Defense Manpower Administration in Washington and became very interested in the *Dictionary of Occupational Titles*. A few of us kept pounding at this relationship between jobs. The Labor Department's Bureau of Employment Security developed a whole new *Dictionary of Occupational Titles* by building a 'family' approach to occupational analysis. In the broad category of mechanics there are not only different kinds of mechanics but

also lesser occupations in the same family. All kinds of cross-hatchings of common skills among these jobs would appear. We went into the worker characteristics in various occupations also. What kinds of people do you find as mechanics, as plumbers, as patternmakers? What are their physical attributes? What are their perceptions?

"When I came back to Quincy after the Korean war and eventually became assistant superintendent for vocational education, these old questions came back to mind. In our discussions, they began to mesh with new questions we were asking about our local situation. What kinds of workers do we need? What kinds of students do we have? Who can we train for what? We knew that funds for an expanded program would soon be coming under the Vocational Education Act of 1963. I shopped around at local universities to see if anyone had any ideas about training according to occupational families. Frankly, we found that we were pretty much alone. Then we approached the American Institutes for Research in Pittsburgh." Financed by grants from the Department of Defense and the Ford Foundation, the American Institutes for Research were completing a survey of basic skills that cut across 31 major categories of vocational training. Mr. Daly approached them to ask if they would like to join in a research proposal to the U.S. Office of Education for developing a curriculum that would organize vocational training in "family" groups. The institutes readily agreed. A joint proposal, identified as ABLE, soon resulted in a grant of $625,000 for a 5-year undertaking. It was established jointly and manned by four staff researchers from the institutes and Quincy high school faculty members.

Training for occupations in the "family" groups

Project ABLE soon identified 11 broad vocational families: business education, computer data processing, electrical-electronics, food preparation, general piping, general woodworking, graphic and commercial arts, health occupations, home economics, metals and machines, and power mechanics.

"Traditionally, in vocational education," says Mr. Daly, "a boy or girl would train for a single, specific occupation. A boy might choose to be a sheet-metal worker. He'd train for 3 or 4 years and then go out and be employed as a sheet-metal worker. Now, that was fine when technological changes came slowly. But today, who knows how they'll be cutting metal 5 years from now. Maybe they'll be doing it with laser beams.

Beyond that, he can go into tool and diemaking. This gets back to our original concept that everybody should leave school with some salable skill."

Method of individual learning

This plan appears in perfect harmony with—in fact, seems to require—a method of individualized learning. Since specific skills must be isolated into learning units, a student need not master these units in lockstep with his classmates. If a learning unit requires that he measure a 45-degree angle in a sheet of copper and then cut it, he may stay at the task as long as necessary to master it. On the other hand, if he masters it in an hour, his teacher may check the learning unit on the student's personal record and assign the next task. The lineup of tasks on a student's record card may be highly individualized, designed for his occupational choice. It may cross widely the lines of traditional training. For example, a student preparing to be an electro-mechanical assembler will be assigned learning units designed for his individual needs from such families and subfamilies as electricity, electronic controls, instrumentation, machine shop, and assembly. Furthermore, because each program is an individual ladder, it may aim at completion by the 10th grade or may continue beyond high school graduation to the 14th grade. The usual artificial lines of "completion" of education are abolished. A boy quitting at the 10th grade is not so much a dropout as he is a trained worker on a relatively low level of skill. But he is prepared to be a wage earner. On the other hand, the boy aiming at a sophisticated skill requiring 14 years of education does not leave school at the end of 12 years under the illusion that his learning is completed.

Just as the continuum of training may extend smoothly beyond the student's 12th year, the Quincy program envisions vocational training beginning before the 9th—in junior high or even earlier. In cooperation with the American Institutes for Research, Quincy plans to develop a course in "basic technology," not only as prevocational training but as preparation that all students need for normal daily living. In an earlier project, the AIR had isolated common components of basic training for 31 major occupations. A second look at these learning components revealed that they were a basic technology for daily living, yet "nothing comparable to a basic job technology * * * appears now to exist or be contemplated in the public school curriculum."

"For example," says Mr. Daly, "here's a thermostat on the wall. People know that when the room gets too cold the dial should be turned up. But they don't have any idea how it works or what it actually does. At home they turn on a faucet and get water, hot or cold, but they don't know where it comes from, or how it gets there, or anything about the whole water system. A basic technology course would start with very simple, familiar things. Here's a battery, a couple of wires,

a bulb, and so forth. You say to the young man, make something happen. Well, he explores, and one fellow learns from the experience of another that you put one wire here and one wire there, and the light goes on. Something must go through here, so let's talk about what's going on. Then you go on from this to learning about resistance and magnetism in the same practical fashion, using familiar objects. This is basic appreciation of what electricity does. You start with an appreciation, a concrete experience. Basic technology just needs to be an understanding of the gadgetry of the world around us. From there, you develop the motivation to go deeper into these things, asking why, and digging into theoretical, conceptual kinds of knowledge."

"Because we now break up common, ordinary knowledge into artificial subjects, many youngsters don't recognize it as real, and the teaching doesn't touch them. We do bits-and-pieces teaching. We say, next year you're going to take chemistry. Then we put them in a chemistry room, and the teacher says, 'Now, this is chemistry. This is not physics. Physics is next door over there.' We give them some test tubes and flasks and things to mix, and they start on something that doesn't look real and they may never get to understand. Yet every one of those youngsters has seen a storage battery. Now, if we can get the chemistry and physics teacher together to say, all right, this is a storage battery. These are the physical qualities of it. This is what it does chemically. Mechanically, it can cause this and that and such-and-such. Then you have an exploratory-discovery kind of situation where a youngster gets curious as to why and maybe gets motivated to do some individual research along a certain line."

Basic technology curriculum for salable skills

Such things as storage batteries and thermostats are universally known gadgets and operate on basic principles everyone should understand regardless of his later choice of occupation. They are examples of what the American Institutes for Research define as "generalizable knowledge." A course in basic technology, as envisioned by the Quincy public schools, would acquaint *all* students, prevocational or preacademic, with generalizable knowledge that falls into six major categories:

1. *Mechanical*, including introductory knowledge of common types of machines, tools, connectors, fluid systems, and measuring instruments.

2. *Electrical*, introducing electricity and electronics as commonly applied at work and in the home.

3. *Spatial*, showing how simple geometry is found in structures and drawings.

4. *Chemical-biological*, explaining how elementary principles of chemistry, biology, and physics are found at work in the human body, medicine, foods, agriculture, and industry.

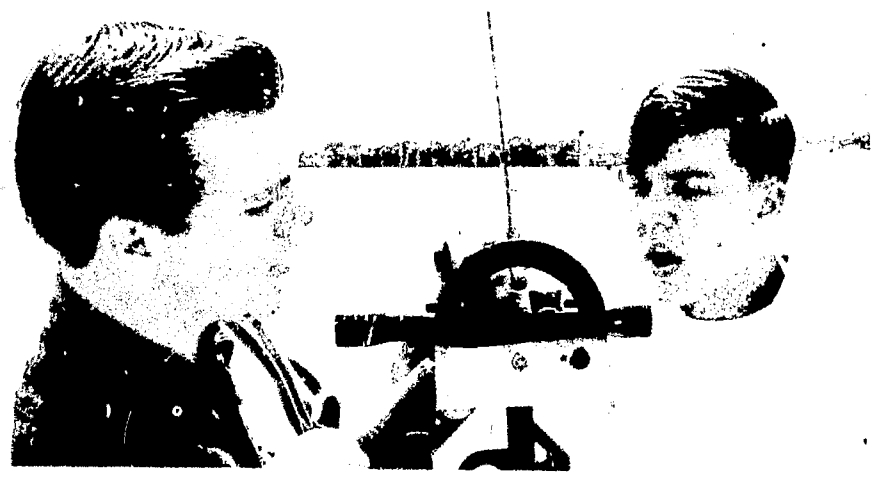
5. *Symbolic*, showing uses of clerical skills—words and numbers—that are important at work and in the home.

6. *People*, indicating important factors in getting and holding jobs—grooming, etiquete, loyalty, intelligent use of time.

Curriculum in basic technology, Mr. Daly points out, must be more than mere lesson material. It can be a prime tool for realistic guidance, beginning in the earliest grades. The most simple of basic technology learning—the battery-and-light-bulb experiment—could be introduced as early as the first or second grade, perhaps even kindergarten, paving the way for more advanced practical experiences long before junior high.

"One student may discover pretty early," says Mr. Daly, "that he likes to work with metal more than with wood. Or he likes electrical things more than he likes graphic arts. If he shows the mental and physical dexterity for one thing more than another after some basic experience with all these things, then we can have some confidence by the time he's in the 7th or 10th grade in believing that he belongs in the metalworking family of occupations, or the electrical, or the artistic, or the sociological, or whatever."

"So we're not talking only about vocational education here. We're talking about a new approach to *all* education in Quincy. If it's going to work in secondary school, it has to affect junior high school. In order to make that work, it's got to seep down to the elementary. If we really believe our thesis that every youngster should leave school with a salable skill, regardless of when he leaves, training has to begin very early, perhaps in kindergarten. There's another way of looking at this. Traditionally, schools have measured growth by achievement in subject matter alone. Much of such growth may be irrelevant. We have to start measuring growth by how much a school prepares a student from his very earliest days, to contribute something useful to the society he's going to live in."



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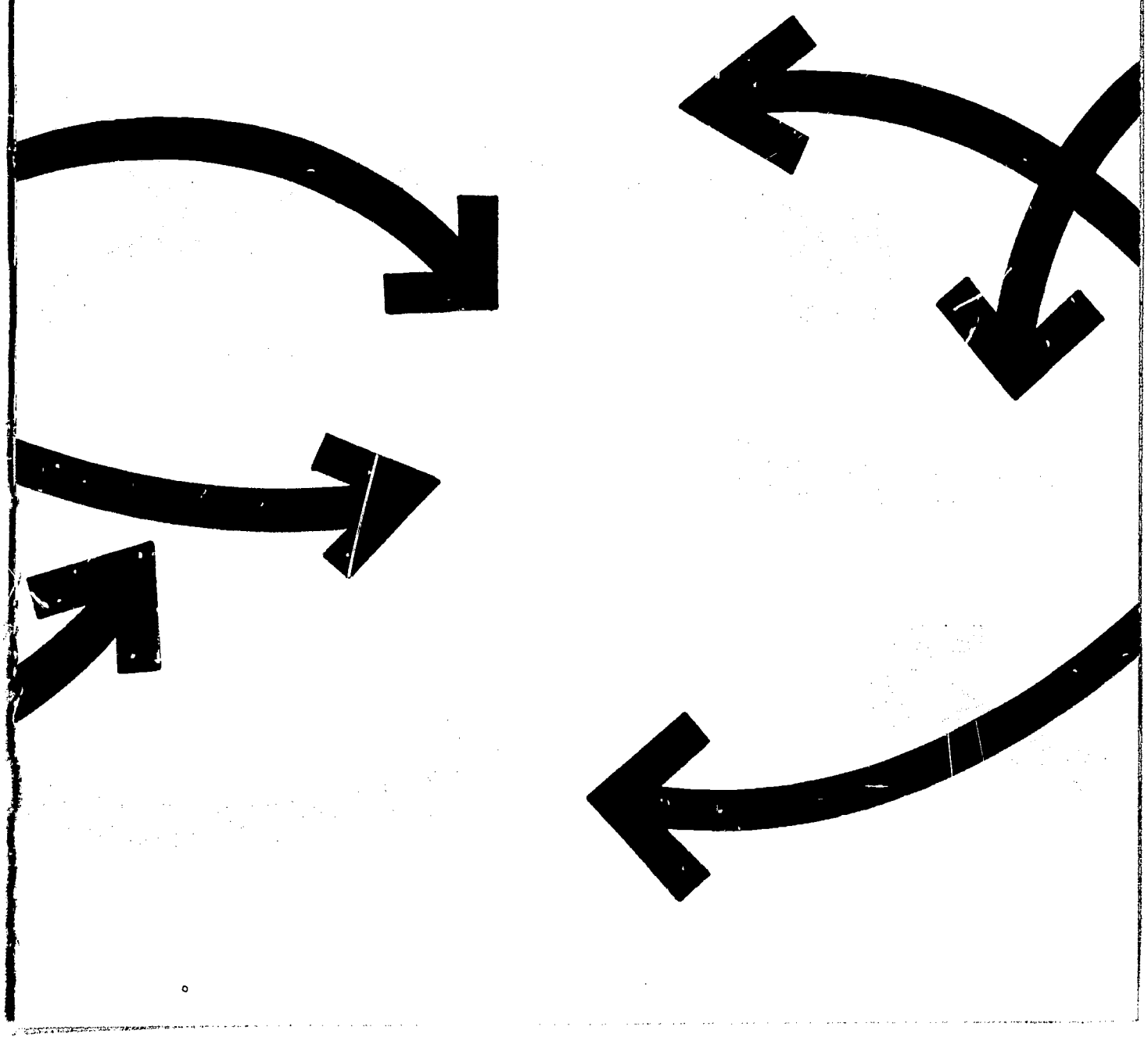

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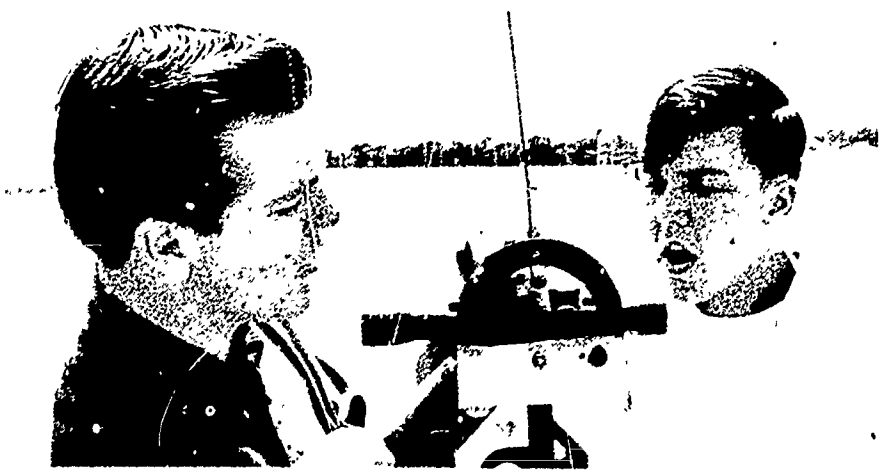

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