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ABSTRACT

A project was undertaken to assess the needs for skills and knowledge among Georgia's high technology teachers and to develop a model for meeting those needs. During the project, 52 teachers involved in teaching electronics, electromechanical, and mechanical courses at six pilot high technology schools were assessed. Included among the processes used to gather information on the teachers' deficiencies in high tech subject areas were a review of existing program information, a review of state-of-the-art programs, a review of literature, a consultation with industry, and a series of meetings with the 52 teachers themselves. While these data sources indicated that Georgia's technical school teachers involved in high technology programs are educationally well qualified for their jobs, a considerable need exists to provide teachers with experiences and support services to maintain their level of expertise and to stay up to date in their field. In response to this need, it is recommended that the Georgia State Department of Education conduct routine skills assessments and staff development activities for high technology teachers and that the state adopt a student to teacher ratio formula and class schedule that will permit at least one high technology teacher per quarter per department to be free for research, study, and/or update activities. (MN)

An Analysis of Skills Update Needs of Teachers in High Technology Programs in Georgia

Prepared By

Vocational & Career Development Department
Georgia State University
Atlanta, Georgia

Harmon R. Fowler, Department Chairman
J. D. Fowler, Project Director
Kenneth R. Allen, Project Director

An Analysis of Skills Update Needs of Teachers in High Technology Technical Programs in Georgia

Introduction

The impact of technology on education has for the past several months been the source of nation-wide concern and debate. It has indeed become one of the most serious issues for consideration by the various candidates in the 1984 presidential campaign and is already hotly contested as this report is written in mid-1983. The Vocational-Technical Education System in Georgia began over two years ago to attack the problem of technical currency and relevance, and effect needed changes in the areas of curriculum and instruction. These efforts resulted in a $13 million appropriation from the State Legislature to upgrade the staff, facilities, equipment, and curriculum of six pilot schools in Augusta, Columbus, Dekalb County, Athens, Marietta, and Savannah, to a status consistent with the state-of-the-art technology being employed in modern "high tech" organizations.

A critical component of the update process was seen early on, to be a means to assess and subsequently upgrade the technical knowledge and skill of existing faculty and staff. The purpose of the research conducted in this study was toward that end.

Purpose

The purpose of this project was to assess the needs of technical education instructors for skills update, and to develop a model for delivering the necessary staff development program to assure such update. Update is defined as developing knowledge and skill levels consistent with the state-of-the-art in a given technology.

Project Objectives

The primary objective of this project was to conduct an assessment of the needs for skills and knowledge among Georgia's High Technology teachers and to develop a model for meeting these needs. Specifically, the objectives were as follows:

- to conduct an on-site assessment of the needs for skill and knowledge update among Georgia's technical teachers.
- to review the high technology curriculum and compare perceived deficiencies with the actual requirements of the technical program.

Work was also begun on these additional tasks:

- to inventory the private sector occupational training capabilities.
- to identify private sector occupational training capabilities and identify industries willing to assist in the updating of the teachers' skills and knowledge.
- to develop a model for delivering a staff-development program through the cooperative efforts of the schools and industry.

Population

All teachers in the areas of Mechanical, Electro-mechanical, and Electronics Technology at the six pilot high technology schools were included in the study. The breakdowns for each discipline were as follows:

Electronics -	26
Electro-mechanical -	15
Mechanical -	11
Total	52

An analysis of teaching credentials from records obtained from the State Department of Education was made to determine the educational attainment level of this population. The data revealed the following:

	Non-degree	Assoc.	Bach.	Graduate
Electronics	1	14	1	10
Electro-Mechanical	2	6	3	4
Mechanical	0	2	6	3
Total	3	22	10	17
Percent of total	5%	42%	19%	32%

Method

The method employed for the gathering of data for this report was action oriented in the sense that passive response to questionnaires and the like were regarded as too sterile, time-consuming, and unreliable to collect the kind of information that was needed. The high technology curriculum was already well underway at the time this inquiry was begun and there was considerable urgency to gather information for immediate input into the program development effort. Listed below is a description of the processes used to gather information on teachers' deficiencies in high tech subject areas.

1. Review of existing program information - All documentation of programs addressed by the curriculum development effort in high technology was collected from the local schools. This included course catalogs and descriptions, course syllabi, course outlines, curriculum guides, and student materials. All material was reviewed for content, utilization of lab experiences, recommended equipment, and texts and references.
2. Review of state-of-the-art programs - With the assistance of the U.S. Office of Education Technical Education Branch, the Center for Occupational Research and Development Waco, Texas, the Society of Manufacturing Engineers, and other resources, a list of schools throughout the United States, offering what could be considered state-of-the-art technical programs was developed. Each of these schools was contacted for input. In several cases visits were made, in other cases telephone conversations with teachers and department heads were conducted, and in all cases, any available program documentation was obtained. All this information was analyzed for

course content and related teacher requirements. During this process the Accredition Board for Engineering and Technology was also contacted, and their input on teacher requirements obtained. Agencies and institutions surveyed in this fashion are listed in Appendix A.

3. Review of Literature - A computer literature search for information on state-of-the-art programs was conducted. Several technical data bases in addition to the Educational Resources Information Clearinghouse (ERIC) were searched at GSU and through the State Department of Education. The national curriculum network of which the Research Coordinating Unit of the Department of Education is a member was also surveyed. All curriculum materials which appeared to be relevant to the Georgia High Technology programs were reviewed and analyzed.

4. Review and consultation with Industry - A critical procedure for this study was the review of the proposed high technology curriculum with a representative sample of Georgia's high technology industries. The companies contacted were recommended by the Advanced Technology Development Center at Georgia Tech, the Governor's High Technology Advisory Council, and GSU project staff. This cross section of companies represented both the developers of state-of-the-art products and the end-users of these products. A listing of organizations contacted is given in Appendix B. Each of these companies was mailed a copy of the proposed high tech curriculum and asked to review the material. (Letter and instructions appear in Appendix C.) Follow-up interviews were conducted by project staff approximately 30 to 60 days after materials were mailed. Interview data was collected from

each reviewer. The interview procedure was designed to elicit maximum discourse in the time available and addressed state-of-the-art needs as perceived by industry versus the proposed curriculum and supporting faculty resources. In as much as the proposed curriculum reflected heavy input from the faculty in the technical schools, the industry reviewers were in effect reviewing what the instructors knew about high technology. This is a critical point in this research procedure. The interview techniques proved very effective in getting specific information probably not obtainable in a paper and pencil survey. Industry input was consolidated and analyzed with changes to course content made where needed.

5. Review with Staff and Faculty - An extensive series of meetings was held with faculty members who were prepared to teach classes in high technology subjects. The project staff operated under a well validated assumption that competent people are usually extremely honest in evaluating their own needs and expertise. It was assumed that teachers would be very open about discussing their needs for update in teaching proposed subjects since they were either presently involved or soon would be, in teaching what was a dramatically revised curriculum. Meetings were held before classes began for high tech students and again at the conclusion of the first quarter. Every teacher who was to teach on high technology courses was contacted in some way. Information from teachers was compiled and compared to information from other schools and information from industry.

Results

The project staff expected to find divergences between the way industry preceived the needs of instructors and the way the instructors themselves perceived them. For the most part, the industry advisers could comment only on what students which they employed knew, relative to what they needed to know, and on the curriculum content in the high technology program as it was out lined for them. There were as it turned out, only minor differences between what industry perceived and what the instructor already knew were their own needs. The overall discrepancy noted was that instructors simply had not had the time or resources needed to stay up to date with the new developments in their area of expertise. The areas of need for skill update are presented below in rough priority order only. The selection of priorities was difficult but was set according to (1) magnitude of importance as perceived by industry (2) magnitude of weakness as perceived by instructors (3) impact of discrepancy on employment demands in Georgia and (4) number of schools and teachers affected. As might be imagined computer related skills were a high priority. There were some surprises in the top 5 priorities however.

Skill Deficiency Areas

1. Computer Skills - Software - The ability of technicians and engineers to be competent in hardware and software is definitely a "megatrend" in the technical world. The primary thrust of this trend is toward high level languages - machine and assembly. As computers become smaller and more user friendly, the programming of chips and operating systems become more of a priority. It is felt that popular source languages such as Fortran IV will be replaced by conversational, even real time programming within the next five to ten years. If this is accomplished the programming

of ROM & EPROM type memory systems will become an even greater priority.

2. Computer Skills - Applications - The use of the computer, and particularly the microcomputer, as a control device is at the heart of the current high technology revolution. Again software skills are important in utilizing the computer in control functions. The whole matter of designing and/or assembling computer interfaces and such things as digital to analog and analog to digital conversions is critically important for technicians in many job roles. Of particular interest are computer applications in data communications.
3. Computer Skills - Hardware - Teachers seem to be more up to speed in this area than the previous two but need to remain that way as systems change. The combining of knowledge of computer hardware with the previous two areas will produce the new breed of technician that modern industry needs. Depending on the job role, actual knowledge of specific electronic components and how to deal with them may or may not be important. It is incumbent on an instructor to have this knowledge and then make a decision as to how far into the hardware hierarchy a student needs to go for a specific job.
4. Programmable Controller - (PLC'S)- The PLC is the most widely applied control device in a multitude of applications. While somewhat less sophisicated than a computer, it nevertheless requires many of the same skills mentioned in the previous three categories.
5. Generic Technician Skills - This area was somewhat of a surprise to the researchers as well as to the instructors. Industry perceived a need to build more troubleshooting skills (really logical thinking) into the instructional process. Troubleshooting techniques

can involve a high level of cognitive functioning and teachers are in need of a systematic way to infuse this approach to problem solving into the curriculum. Related skills which also are desired and which must be taught as a part of a total process of instruction are proper use of test equipment and procedures (precision, accuracy, etc.) and quality control awareness/methodology.

6. Electromechanical Systems - The use of the computer as a controller has linked together diverse electronic and mechanical systems and operating devices. This is another characteristic of "high technology." The technician must now understand, in addition to electronics-mechanical systems, fluid power systems, interfacing procedures, and sensitive electro-fluidic control circuitry. The most obvious example of such systems is the industrial robot.
7. Manufacturing Technology - Robotics/CAM - Manufacturing technology training is a pervasive deficiency in American education. Studies by the Society of Manufacturing Engineers (SME) reveal that there is not an acceptable number of students at any educational level being prepared to deal with modern industrial processes. At the same time economic forecasting groups such as Prudential-Bache Securities, predict a heavy swing toward automated manufacturing as a competitive weapon in the current global economic productivity struggle. Manpower predictions vary, but there seems to be little doubt that technicians skilled in robotics, CNC machining, and related computer assisted technologies are in high demand and short supply and will continue to be for sometime. Georgia's technical schools at the time of this study were extremely deficient in this area.

8. Computer Aided Design (CAD) - National predictions forecast a demand for 100,000 CAD operator/technicians by 1990. Training on CAD systems is time consuming and costly with the bill for 100,000 trainees set at $1 billion if conducted by industry. At the time of this report there was no CAD program operational in Georgia although several were proposed. Instructors in drafting and design technology, and in mechanical technology need assistance in selecting appropriate hardware and software, developing curriculum, and in getting sufficient hands on skill to allow them to teach the subject.
9. Manufacturing Materials - Industrial uses of new alloys as well as non-traditional materials in plastics and adhesives has greatly expanded. These materials, ever stronger and lighter, are finding wide applications. Almost no expertise in metallurgy, engineering materials, or statics and dynamics was found in the technical schools.
10. Feedback and Control Theory and Application - An understanding of the theory of feedback and control devices and systems and its wide-application to diverse areas of industrial technology is essential to modern technicians. There is apparently little understanding or awareness on the part of instructors of the interrelationships of these concepts across industries and across systems. Microprocessor based feedback and control systems to reiterate are at the heart of high technology.
11. Laser/Electro-Optics - Research in the Laser electro-optics field is being spearheaded by Bell Labs and Western Electric, headquartered here in Gwinnett County. Applications of laser light-emitting devices is on the threshold of an explosion in the area of data communication. It is predicted by some to replace digital electronics

as the primary transmission mode in computers and related devices. There is also increasing applications of laser technology in measurement, metals cutting and welding, and sensory feedback. There is virtually no expertise in Georgia schools in the laser/electro/fiber optics field.

Conclusion and Recommendations

Data analyzed in this study indicates that Georgia's technical school teachers in high technology programs are educationally well qualified for their jobs (51% at the baccalaureate or higher level, 32% at the masters level). There is a sound foundation for meeting the ABET requirements for staff qualifications. There is considerable need however, to provide teachers with experiences and support services to maintain their level of expertise and stay up to date in their field. There is at the same time widespread interest and willingness on the part of industry to participate in the development of update programs. The organizations contacted in this project mentioned many options whereby they might be of assistance, including seminar training, experience exhange programs, hands-on experiences for instructors, and other activities. The only obstacle to the development of routine skills update functions is a method for program administrators, state staff, local schools, and industry to coordinate and interface their mutual interests. It is hoped that some method of state level coordination through such groups as the Governors High Technology Advisory Council can be developed. The following specific recommendations are made by the project staff:

1. That a specific individual within the State Department of Education as a contacted third party be assigned to coordinate routine update of staff in high technology and that this function be co-sponsored by the High Technology Advisory Council.

2. That a regularly administered skills assessment procedure be adopted and implemented (see Appendix D for a possible methodology).
3. That staff development activities be projected, planned, and scheduled at least one year in advance.
4. That the State adopt a student-teacher ratio formula and class schedule that will permit at least one high technology teacher per quarter per department to be free for research, study and/or update activities.
5. That Research Centers be developed at selected local sites and dedicated to developing expertise for sharing with other schools within a specific technology. (i.e. robotic/electromechanical center, an electronics center, a CAD center, etc.)

Summary

The research conducted in this study revealed that the level of expertise possessed by the technical instructors in the six pilot high technology sites was consistently high. These teachers possess a level of educational and professional attainment that provide a sound base for the development of staff credentials at or above those specified by ABET. The only real area of deficiency was in the process for skills update available to the instructors. The state-of-the-art in the technical world has been changing almost daily for the past several years and teachers have been hard pressed to find the time needed to pursue study and research in new developments. The specific areas of deficiency noted in this report can be quite quickly made up if instructors are simply given a planned program of developmental activities, and the time to do the "homework" that will be required.

APPENDIX A

Technical Schools

And Colleges

Surveyed Nationwide

Camden County Community College
(Bleckwood N.J.)

Milwaukee Area Technical College

Piedmont Technical College
(Greenwood S.C.)

Central Piedmont Community College
(Charlotte N.C.)

Southern Technical Institute
(Marietta Ga.)

Rochester Institute of Technology
(Rochester N.Y.)

Oklahama State Technical Institute

Texas State Technical Institute

Los Angeles Trade & Technical College

Macomb Community College
(Macomb Intermediate School District, MI)

Pensacola Junior College

Miami-Dade Junior College

North Central Technical Institute

Chattanooga Technical College

Bradley University

State University of New York

APPENDIX B

Industries and
Organizations Surveyed

Scientific Atlanta

Chronomatics

Hewlett-Packard

Western Electric

Bell Labs

Lockheed

Rockwell International

Robot Systems Incorporated

Teletranix

Computervision, Inc.

Delta Airlines

Miller Brewing Company

Southeast Paper Company

Pratt & Whitney

Lanier Business Projects

Digital Equipment Corporation

Shain & Associates (CAD/CAM Consultants)

Augusta Newsprint

Buckeye Cellulose

Grumman Aircraft

Robins Air Force Base
(Maintenance Facility)

U. S. Army Signal School
(Fort Gordon, Georgia)

TDK Electronics

TRW

Society of Manufacturing Engineers

American Electronics Association

APPENDIX C

Letter to Reviewers &

Selected Written Responses

Georgia State University
a unit of the university system of georgia

university plaza
atlanta, georgia 30303

November 8, 1982

Mr. Ed Thomas
Personnel Manager
Buckeye Cellulose
P. O. Box 8407
Memphis, Tennessee 38108

Dear Ed:

It was a distinct pleasure chatting with you recently.

As I explained, all too briefly, I am working through G.S.U. to assist in structuring curricula for a series of two-year associate degree programs. These programs will be offered by six Area Vocational-Technical Schools.

The six schools are pi[illegible]ects for possible further expansion of the high-technology courses. Three will offer two-year associate degrees in the initial phase, with the others working toward that end.

This project was generated largely through our great, out-going governor, Mr. Busbee. This effort was one of his final, far-reaching, plans to upgrade our ability to attract and staff high-technology plants. It was fortunate, and correctly done, that the vocational schools would receive the job.

The core curricula, through four and five quarters, is virtually complete in all disciplines. My task is to gain review and assistance, from high-tech employers, in structuring the specialty courses which "round out" each technicians curriculum.

There will be three basic curricula:

1. Electronics
2. Electro-Mechanical
3. Mechanical

In turn, each discipline will have options, for example:

1. Electronics

    a. Electrical power and distribution
    b. Industrial
    c. Communications
    d. Avionics

I am trying to match the disciplines, with their various options, to companies that are dealing with employment of engineering technicians (not engineers).

I know that Buckeye presently has a broad spectrum of technicians due to the nature of process manufacturing.

I am submitting the following general plan for your consideration (and simultaneously soliciting your ideas for doing the job):

1. I am enclosing an outline of the disciplines and their options as we have structured them to this point.

2. Allow you time to study them and consult with your staff.

3. Get back with you to discuss the curricula and clarify any questions you may have (if I can).

4. Set a time to tour Georgia plants to refresh our knowledge of what you are doing, then meet to discuss thoroughly our proposed curricula. This discussion is intended to draw from you, and your staff, suggestions and recommendations which will allow us to put together a strong finale to the courses of study.

As I mentioned to you in our phone conversation, proper credit will be given for the invaluable assistance you and your company can render to us in this effort.

The above approach is suggestive only; and, since we are both pioneering in this, I would very much welcome your suggestions.

I look forward to the possibility of meeting with you soon.

Sincerely,

J. D. Fowler, Project Director
High-Technology, Department of
Vocational and Career Development

Enclosure

Area for which reviewer was recommended _____

1. Sections I and II of the Preliminary Guide simply give an overview of what we believe technician level training should be and how we have organized the curriculum.
2. Section III beginning on page 21 breaks down the curriculum more specifically. Exhibit 2 on page 24 lists the various program options. Exhibits 3, 4, and 5 list the technical core courses which all students will take in a given technology no matter which option they choose.
3. Each student as you may notice will take 15 quarter hours of math and 15 quarter hours of technical physics.
4. Each student will also take 4 to 5 courses in their specialty option, be it robotics, computer electronics, etc. This series of specialty courses is designed to be task-specific and will conclude with a problems or practicum course for each student. A practicum could conceivably consist of an internship within a sponsoring organization.
5. Overall schedules are given on pages 29, 30 and 31 (revised electronics schedule in the addendum).

Please review these materials as presented. We solicit your input on any item of concern but specifically need the following kinds of information:

1. Suggestions for course content in the 4 or 5 specialty courses. We will write outlines for these courses including student competencies just as they are done in the Preliminary Guide.
2. Suggestions as to where content of core courses and math and physics courses should be amended.
3. Input on the student competencies that should be attained in each course (i.e., what should a student know and be able to do as a result of each course?)
4. Suggestions for appropriate laboratory experiences for each course.
5. Sources of existing text or training material of any kind for a given course or topic.
6. Your view of how well this curriculum would prepare a technician for the entry level tasks he or she would have to perform in your organization.
7. Your view of how well this curriculum would prepare a technician for advancement to more sophisticated work assignments within your organization.

Thanks again for your help! We look forward to meeting with you in January.

Lockheed

A Division of Lockheed Corporation
Marietta, Georgia 30063

March 9, 1983

J. D. Fowler
Vocational & Career Development
Georgia State University
University Plaza
Atlanta, Georgia

Dear J. D.:

We at GELAC appreciate the opportunity to work with you in developing the preliminary planning guide for high technology courses.

We have reviewed the material as presented and have the following observations to make shown by course title:

MANUFACTURING PROCESSES I

Optical measuring devices are being replaced by laser levels and distance measuring equipment where very accurate measurements are needed. Lasers can also be used with increased speed and with tolerances better than 1/4" per 100 feet in applications such as leveling large buildings, etc.

Accurate leveling and alignment of machine tools should be included as a use for lasers. Devices are available with accuracies of better than 1 second of ARC in 10 feet and can be used in distances greater than 10 feet. We suggest the addition of laser measuring devices as part of Section VI.

ELECTROMECHANICAL DEVICES

We believe a discussion of digital incremental and absolute encoders should be included after VII synchromechanism. In many applications encoders are replacing synchros as a position device.

VIII Encoders

A - Incremental
B - Absolute
C - Gray Code

LINEAR INTEGRATED CIRCUITS

The outline looks good but we are concerned if enough time is available to thoroughly cover this very important material. Two courses may be required to properly present the necessary information.

ENGINEERING GRAPHICS

Up to outline level VII the course as shown is very good. It would seem that some amount of time would be necessary to aquaint the students with the procedures necessary to use a computer for graphics. Additional time would be required in the lab to make this training worthwhile.

If possible we would suggest adding a complete course dedicated to computer graphics.

I. History of Computers in Graphics.
II. Applications for Computers in Graphics.
III. 2D & 3D Graphics Fundamentals.
IV. Isometrics.
V. Orthographics.

We believe this curriculum to be very good in most cases. The general danger we have now is the tendency to become too much theoretically oriented and not enough coverage of practical information.

The revised electronics courses covers needed material much better than the original outlines.

Again let me commend you on the efforts you have put forth in developing this program. If I or anyone else here can be of assistance in any way please feel free to contact me at 424-2934.

Sincerely,

LOCKHEED-GEORGIA COMPANY

Lamar Henry
Training Coordinator

LH/mld

The Buckeye Cellulose Corporation
A Procter & Gamble Company
Offices: 1001 Tillman Street, Phone: (901) 454-8100
Mailing Address: P. O. Box 8407, Memphis, Tennessee 38108

January 7, 1983

Mr. J. D. Fowler
Project Director, High Technology
Department of Vocational and Career Development
Georgia State University
University Plaza
Atlanta, GA 30303

Dear J. D.:

I enjoyed talking with you today, and, as you requested, I am summarizing Buckeye inputs on the Engineering Technology Program curriculum guide you sent earlier.

An Associate Degree graduate with eight to ten years' experience at Buckeye responded that it seems to be a very comprehensive curriculum and covers the basic skills of engineering. He also said it was more comprehensive than his curriculum requirements had been.

I also requested input from our engineers, including an Associate Director of Engineering. The following is a summary of Engineering's and also my own input.

1. As you well know, computers are rapidly penetrating all aspects of business and industry today, and it appears that this will continue at an increasing rate. It seems that the specific computer courses would provide computer literacy, but we feel this should be extended to provide functional capabilities as well. It is highly likely that your graduates will be required to interface regularly with computer applications such as CAD, CAM, or others.

2. In the Mechanical Technology curriculum, it would be desirable to equip graduates with sound basic understanding of AC, DC, and electronics, and a working knowledge of how to use logic diagrams for basic trouble-shooting. This is not intended to imply the capability to perform complex trouble analysis and repair of electrical or electronic systems, only basic skills.

3. The ability to write a clear, concise memorandum or report is a prized skill in most industry. The lack of this skill is a shortcoming which we frequently see in technically educated employees. I believe a course on report/memo writing would be a strong plus for your graduates. When I was in school, the emphasis was on "word inflation," which tends to cloud content. (Write at least 500 words, even if 200 are adequate.) This course should emphasize "word economy," which will highlight content. This forces clear thinking, since incomplete or poorly conceived ideas cannot be obscured by word fog.

I hope this will be useful as you continue developing and refining these high technology programs. Please feel free to call if I can help further.

Sincerely,

THE BUCKEYE CELLULOSE CORPORATION

H. E. Thomas
Training and Development Manager

HET/jlt

P.S. As I mentioned to you, contact Bill Peters, Employee Relations Manager at Barnesville, (404) 358-2440, to set up the tour.

UNITED TECHNOLOGIES
PRATT&WHITNEY
AIRCRAFT

400 Main Street
East Hartford, Connecticut 06108

Manufacturing Division

January 12, 1983

Mr. J. D. Fowler
Project Director
Georgia State University
University Plaza
Atlanta, Georgia 30303

Dear J. D.:

As you will see from the attached comments, I asked several of my people who have far more technical expertise than I, to review the material you sent. As I told you on the phone their suggestions are minor and we are really most impressed with the curricula you and your people have developed. I don't think any of our thoughts are of such magnitude that we could justify a trip to Atlanta. However, if you feel there are specific areas where we can assist, let me know and perhaps we can work something out.

My own trips to Columbus are, barring emergencies, completed since we now have a personnel manager, Don Colby, resident there most of the time. Much as I'd enjoy talking with you, looks like we'll have to take a raincheck on it.

I have not forgotten the proposed seminar on Metallurgy and will be happy to explore the possibilities when you're ready.

Yours truly,

J. M. Lyman
Manager
Technical Training

mjd

Attachments

Internal Correspondence

UNITED TECHNOLOGIES PRATT&WHITNEY AIRCRAFT

03:83

To Mr. J. M. Lyman

From J. L. Wallbeoff Ext. 5-4008

Subject Review of Preliminary Curriculum Planning Guide
Georgia Engineering Technology Program

January 6, 1983

Our review of the referenced program resulted in several recommendations in respect to the mechanical technology areas.

1. There appears to be a lacking in the manufacturing processes areas in regards to advanced machine tool systems such as flexible machining centers and robotics that are becoming increasingly important in computer and numerically controlled machining operations.

2. Additionally, there should be increased emphasis on application of the learned material to practical situations including more "hands-on" machine tool operation.

3. There is no evidence of solid geometry or trigonometry in the curriculum that we feel is essential to understanding complex machining operations and machine tool setups. The curriculum on engineering graphics should be expanded to include auxiliary views and practical shop problems using solid geometry and trigonometry applications.

The general consensus is that the preliminary curriculum is well designed and should meet the stated objectives.

J. L. Wallbeoff, Supvr.
Mechanical Training
114-13

JLW:jm

PRATT & WHITNEY AIRCRAFT GROUP

Internal Correspondence

131:82

To Mr. R. Gromelski
R. Somerday

From C. Parent Ext. 2047

Subject Review of Georgia's Engineering Technology Programs

December 2, 1982

The major difficulty we (Cyr Parent and Bob Somerday) ncountered while reviewing the engineering technology curriculum planning guide was with trying to comprehend Georgia's quarter hour system. After some deliberation it is our belief that each quarter is ten weeks long. This aspect caused us some problems with exhibits 7,8, & 9 until we examined each course description. Other than that, the only minor contention is the early introduction to computer fundamentals in each of the curricula. We feel that it should be replaced by trigonometry and reinstituted somewhere in the fifth or sixth quarter.

R. Somerday
Technician Training

C. J. Parent
Technical Training

RS:CP:lab

Internal Correspondence

UNITED TECHNOLOGIES PRATT&WHITNEY AIRCRAFT

10:83

To Mr. Robert Gromelski
Cyr Parent
From R. Somerday Ext. 2047

Subject Electronics Technology Curriculum Review

January 11, 1983

In answer to your review guideline:

Item one - (1) Computerized Numerical Control Concepts
(2) Robotics Applications
(3) Programmable Logic Controller Applications

Item two - No suggestions

Item three - (1) Should be able to perform fundamental programming routines and comprehend the block diagram and associated control circuitry.
(2) Should be able to program motions of a robot and comprehend block diagram and associated control circuitry.
(3) Should be able to correlate ladder diagrams to user programs and comprehend I/O structure, processor functions, memory mapping and troubleshoot via program terminal.

Item four - No suggestions

Item five - (1) Allen-Bradley 7300 or 8200 series controls
(2) ASEA
(3) Allen-Bradley 2/30 or 3 series controllers.

Item six & seven - if competent in all areas of this program the individual would be a valuable asset to many industries.

Cyr Parent

R. Somerday

CP:RS:lab

Computer Electronics

After examining the recommended curriculum for Electronics Technology (exhibit 8 or revised outline), I have found that only 23 cr. hours of electives and specialty courses are allowed. My personal opinion is that this <u>small</u> amount of specialization is not adequate to train a student to be competent in any area of technology. I feel that an indepent curiculum for each specialty would be of much greater value than having a general knowledge of many specialty areas.

I feel the courses offered in Digital Electronics and Computers are excellent if they are all taken, with the possible exception of the Assembly Language Programming. I feel a universally accepted program such as Basic or Pascal would be much better than one tied to a particular computer.

Bill Lynch
Inst. Supervisor
Miller Brewing Co.

Instrumentation - Industrial Controls

Instrumentation and Controls

Course Outline

I. Principles of Process Control

A. — This should include "Feed Forward Control" as well as the other control concepts listed

Courses outlined for the different types of measured variables look very good.

The Student Laboratory Exercizes could stand much improvement.

There should be troubleshooting exercizes performed on different types of instrumentation loops

Students should be required to "set up" and tune a complete instrumentation loop from the measured variable to the final control element, both pneumatic and electronic loops.

These types of lab exercizes are of greater practical value.

There needs to be a course available that shows the interface of process instrumentation with programmable controllers.

COMMUNICATION CKT

Course outline

section IV
ITem D High Freq. CKTs

Aerospace electronics has moved into Freq. ranges above 2 GHz and There i A Need to Know strip line ckts used in Filter and Amp. ckts. How does Noise Figure enter into Amp. design, how to measure Noise Figure and also input & output matching in Amp. design.

section V
ITem C

You discuss class "C" and "B" Amplifiers, what about class AB, AB_1 & AB_2, They are common in single sideband Amplifiers used in commercial Applications

section VII

item A IN addation to Am mod., be sure to cover Phase mod. & PCM, These Are common in Data Transmission — Am is a rare Type of modulation today — limited mainly to Am Broadcast stations & VHF Aircraft. I feel more Time should be spent on FM, SSB, DSB, PM & PCM modulation because These Are The ones That he will Run into Today.

General comment.

I find very little wrong with the basic electrons courses, it is basically a good curriculum.

The basic core courses like english, math etc are good but I wonder if the time would not be better spent in his or her particular area of specialization, give him only the skills required to understand the specializations. I have worked in Aerospace electronics for over 20 years plus I hold a degree in education, so I feel like I know & understand what is needed to turn out a good Tech. —

why not set up a program right, instead of like everyone else.

Jerry Grange
127 Thimblemill dr.
Albany, GA
431-1963

July 11, 1983

Mr. J. D. Fowler
Vocational & Career Development
Georgia State University
Atlanta, GA 30303

Dear Mr. Fowler:

As you requested, I have examined your curriculum for the Engineering Technology Program. The observations that will follow are based upon my opinion of the application to this company's needs and conversations with my peers.

The technology of modern heavy industry is advancing at a rapid pace. A pace that the average plant cannot prepare its people effectively to cope with in an efficient manner. The mechanics or technicians of the past are limited due to their training or lets say lack of training and it is almost impossible for us to adequately re-educate these individuals.

The curriculum you are presently developing offers a solution to this problem. Graduates from such a program are in my opinion the technicians and supervisors of the future. They would have the foundation to learn and understand the practical experience they would receive.

A well-balanced program is important to provide these individuals the tools necessary to develop in the direction their career takes them. Specialization is fine in certain areas, but at times is very limited. A good example of this is the industrial movement to a multi-craft or general craft concept for greater utilization of personnel.

I also believe the integration of such courses as economics and labor relations gives the students a broader understanding of their workplace and helps them adapt into a productive employee.

This type of program certainly has my approval and I believe it could easily provide a lasting source for many of our employment needs.

Sincerely,

Robert E. Richman

mj

APPENDIX D

Outline and Sample
Survey Forms for
Skills Analysis and Update

Implementation of a Staff Development Update System
for High Technology Teachers - Critical Events Outlined

The following outline is intended to specify the minimum activities that would be required for the development of a routine program of technical skills update for high technology instructors.

1. Assign staff development function to a specific individual within the SDE or a contracted third party.
2. Identify an industrial advisory board, preferably as a sub-group of the Governor's High Technology Advisory Council for the expressed purpose of supplying state-of-the-art information on technical advances in industry.
3. Generate a list of subject matter priorities with the advisory board.
4. Survey additional industries and agencies for the relative perceived importance of items on this list.
5. Compile data and prioritize needs.
6. Survey school staff for perceived level of expertise in priority areas. Verify by follow-up visits if necessary.
7. Compile data and compare needs to resources.
8. Plan and schedule workshops with assistance of advisory group.
9. Publish schedule at least one year in advance.
10. Evaluate workshops with participants and presenters.
11. Continue planning and survey procedures on a two to three year cycle.

Staff Development Questionnaire: Industry Advisors

Topics	How relevant & critical is this topic to your field? (extremely relevant 1 2 3 4 5 unimportant)	How well prepared are technicians in this topic? (fully up to date 1 2 3 4 5 uninformed)
I. Plastics (for M.E. Technology Teachers)		
A. Thermo-sets	1 2 3 4 5	1 2 3 4 5
B. Laminates	1 2 3 4 5	1 2 3 4 5
1. Fiberglass		
2. Graphite		
3. Boron		
4. Kevlar		
5. Other		
C. Thermo-welds	1 2 3 4 5	1 2 3 4 5
D. Others	1 2 3 4 5	1 2 3 4 5
II. Metallurgy		
A. New alloys	1 2 3 4 5	1 2 3 4 5
B. Powdered metals	1 2 3 4 5	1 2 3 4 5
C. New testing techniques	1 2 3 4 5	1 2 3 4 5
D. New techniques of predicting, preventing & treating corrosion		
III. Fiber Optics		
A. Theory of operation	1 2 3 4 5	1 2 3 4 5
B. Application	1 2 3 4 5	1 2 3 4 5
IV. Lasers		
A. Theory of operation	1 2 3 4 5	1 2 3 4 5
B. Applications	1 2 3 4 5	1 2 3 4 5

Topics	How relevant & critical is this topic to your field? (extremely relevant 1 2 3 4 5)	How well prepared are technicians in this topic? (fully up to date 1 2 3 4 5 uninformed)
V. Digital Devices		
A. Programmable Controllers	1 2 3 4 5	1 2 3 4 5
B. Digital interfaces		
C. Electro-mechanical devices	1 2 3 4 5	1 2 3 4 5
1. DC stepping devices		
2. Freq. controlled AC drives		
3. Newest fluid control devices		

VI. Other topics (list)

Title _____

Company _____

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APPENDIX E

Representative Summaries of Meetings with Instructors

1st Quarter Course Review (Informal)
Athens
1-5-83

1. All high-tech instructors were together in one room, relaxed & informed.

2. Technique was to "do round the table" to each instructor and elicit responses to "good" and "bad" about first quarter, plus recommended additions, deletions, revisions, etc.

3. Math. General opinion is that "Fund." course provides some opportunity for a refresher.
   a. Majority appears up to the course before them.
   b. About 30% seems questionable (but some improving)
   c. Word problems seem to give some trouble (as always).
   d. Plans are laid to "synch" math w./ other subjects.

4. Physics. Hasn't been presented. Some apprehension that is may not "fill out" time frames and possibly too "cook bookish."

5. English. In general, skills are not good.
   Problems with basic writing (much less technical)
   a. Majority level and progress such that there is concern for meeting minimums.
   b. Need to address this area.

6. Computer. In general, students seem capable.
   a. Some problems of course time mgt.
   b. Some incomplete, but working under extension.

7. Fundamental Course. Consensus that it is worthwhile.
   a. Provided some math review and refresher.
   b. Could be improved to worthwhile status.
   c. Perhaps add logic and problem solving technique.

8. General Observations:
   a. Student motivation is good.
   b. "Work shock" occurred. Students did not expect rigor & homework required.
   c. Concern over AC & DC in one quarter.
   d. Concern for more circuit analysis.
   e. Concern that student "keep current" on computer.
   f. General recognition of what needs to be done and quality expected.

g. High spirit of cooperation and interrelating.

h. Distribution is low in ME (1). Suggest renaming to "Computer Aided Mfg. Technology."

i. Seminars endorsed in:
   (1) Plastics
   (2) Metallurgy
   (3) Laser & Optics
   *(4) Feedback systems & prog. controllers.

* Verified by earlier conversation (CPCC trip)

1st Quarter Review (Informal)
Augusta 1-6-83

General Observations:

1. Enthusiasm is high, staff working over, etc. to better serve students.
2. Not as well articulated re., UTC, as Athens needs some attention.
3. Some turf protecting "between E.E. & physics.
4. Some apprehension on A.C. & D.C. in one quarter.
5. Documentation of job done is very good.
6. Quality stds. appear good.
7. "Work shock" on academic load & homework, some apprehension that working students may drop.
8. Looks a little weak in ME (no M.E. grad aboard, & technician recognizes lack in areas of theory, such as stress, strength of matl's etc).
9. Corroroboration on poor communication skills & time assigned to correct this (may require policy re: if successful technically, do we "pass").
10. Poor distribution in M.E. (3). Need better description(s) of possible career option.

1st Quarter Review (Informal)
Columbus 1-13-83

1. Meeting was attended by Messrs. Carlson Stezlecki, Spence, the physics instructor, the electronics instructor and the drafting/design instructor.

2. Atmosphere was informal, tone was, "Tell us how it went, both good & bad."

3. Course feedback:

   a. "Fundamentals" is needed, but with modifications. School found sections on measuring, math, etc. to be especially needed. Idea: Use computer in building student folder.

   b. Language skills deemed basically adequate. This is in contrast to other schools' findings. (There were a few D's).

   c. Physics teacher says "UTC" seems O.K., but that the text is too basic.

   d. Math instructor says "They should come w/ skills suggested in Cord.

   e. "Computer Fund." a motivator.

4. Student profile:

   a. Stamme scores of 7 & 8!
   b. 51 ind[illegible]ted, 1 dropped out academically, 1 w. personal problems.
   c. Stude[illegible] are highly motivated.
   d. Students are undergoing "work shock."

5. Articulation of staff:

   a. Math, physics & "core" instructors seem very good.
      Example: Chairman (mech engr.) discussing transformer problem w. electronics.
   b. There seems to be a good try at UTC at Columbus.

1st Quarter Review (Informal)
Savannah 1-14-83

1. Prelim. mtg. w. Richard Shinhoster:

   a. Looked at lab layouts. Some problems such as: Plumbing in on first layout & second layout makes this unworkable!

   b. Discussed staffing needs. He has a fine prospect (female) which Lab apparently cannot hire due to moving costs.

   c. There is recognition of staffing needs.

   d. . profile of student progress & success didn't jibe w. instructor!

   e. Reluctance to accept exit exams for Quality Control.

2. Meeting w. instructors:

   Informal, ie "How did it go?" Tight at first but became informational

3. Course feedback:

   a. "Fundamentals" is needed. Helpful in areas of math, measuring, etc.

   b. "English skills are low. Need to concentrate on basics (as heard before).

   c. Physics comments are weak, w. the feeling of this interviewer that they want and need a physics major in this area.

   d. Math instructor & electronics instructors feel that math skills were set too low.

4. Student Profile:

   a. Language & math skills were deemed marginal.
   b. Should consider "pre-tech" courses.
   c. Motivation, as usual, was good.
   d. Attrition is estimated to eventually be 30+%.
   e. Low M.E. option. Need to address this across the board.

5. Staff Articulation:

   a. Good under very trying conditions

   b. There is apprehension in two areas:

      (1) Specialist staff in physics & mechanical is needed.
      (2) Student goals are too low.

   c. UTC is accepted by the staff, however, no physics & M.E.'s to concur or disagree.

6. Final opinion: Savannah has a long climb ahead!

1st Quarter Review (Informal)
DeKalb Tech
1-17-83

1. In Attendance:
   Ken Kent primarily, with some input from Wayne Brown & Mr. Bechtel.
   Std. ques.: "How did it go?"

2. Course Feedback:
   a. "Fundamentals" are needed. Provide valuable time for measuring etc., and give overview of what technology is. Would revise before reoffering.

   b. Math. Usual distribution of skills, same idea of "pre-tech" course.

   c. English. Skills are not good, need intense emphasis on basics, then on to technical type comm. training.

   d. Computer Fundamentals. Is a motivator, success ratio fairly good.

   e. Apprehension about AC & DC in same qtr.

3. Student Profile:

   a. Good motivation.
   b. Approx. 30-40% attrition in 1st quarter.
   c. Apparently no large problem in recruiting.

4. Staff Articulation:

   a. Fair, with same problems of lack of lab equipment, etc.

   b. There seems to be a "tongue in check" attitude re: UTC. This reviewer senses a desire to package & present in a traditional way.

   c. Mechanical seems to be "plowing their own row" & giving little serious attention to "Hi Tech"!

5. Summary Comments:

   a. DeKalb seems more comfortable with high tech, possibly because of having offered E.E. & M.E. technology.

   b. Conversely DeKalb seems to want to hold to tradition: Not terribly impressed w/ UTC, want AC & DC separated, etc. (This seems in part due to desire to continue to articulate with S. Tech.)

   c. Low distribution in M.E. May be title & probably needs better understanding of M.E. vs CAD/CAM career.

1st Quarter Reviews (Informal)
Marietta Tech
1-18-83

1. Setting:

Informal, with first quarter teachers and admissions personnel + Brady James (no math input).

Same question: "How did it go?"

2. Course Feedback:

a. "Fundamentals" is needed, particularly for extra review in math and for measuring. Would change (as all have said).

b. English. Communications skills are not tops. They need basics, then on to tech. English.

c. Computer Fundamentals, Didn't finish as prescribed. Success rate and some had skills equal to instructor going in. Motivation, as usual, was good.

d. Again, suggest "pre-tech" courses

3. Student profile:

a. Many have previous college background.
b. Math deemed marginal by some instructors.
c. Attrition rate is 40% to date (20 to 12).
d. Most elect E.E. or E.M.T.

4. Staff Articulation:

a. Poor. It has been expressed to this reviewer that no one is coordinating this effort (by several instructors).

b. Obviously not a lot of effort has been put on UTC or interrelating subjects.

5. Summary Comments:

a. Instructors have concern for math & lang skills.
b. Instructors feel lack of coordination.
c. Question arose "How to hold students vs. S. Tech when we demand more work"?

APPENDIX F

Representative Summaries of
Meetings With
Industry Advisors

Curriculum Review - Southeast Paper Co.

3-7-83

1. Attendees:

   Mr. Gary Peters, Personnel Manager
   Mr. Ken Ross
   Mr. Frank Newman, Engineer
   Mr. Ron Secrest, Personnel & Training

2. Informal setting, led off by company comments:

   "Broadest-based two-year program seen."
   "Can you do it in two years"?
   "Can an E.E. (for instance) come back & get added courses & earn E.M.T."?

3. Suggestions:

   Be sure to give "hands-on" experiences such as aligning shafts.
   Would like to co-op & would become involved.
   M.E.'s (for Southeast) need strong machine and machining experiences.
   Have noted poor job expectations (understanding) from other 2 year programs. Would address through: (1) Counseling (2) Co-op (3) Speaking to classes.

   Expectation at Southeast: Enter maint. force, work to further broader skills, then could expect upgrade to supervision, or eventually, to engineering.

Ft. Gordon
E.E. Specialists

1-20-83

1. Setting-

Prelim. with Clarence Jeter & staff, to set tone & purpose, then met w./ instructors.

2. Significant items & suggestions.

a. Assure solid foundation in digital electronics.

b. Need second comm. course in Communications Specialty.

c. Avionics should be basically FAA based systems.

d. Assure that all get digital interfaces.

e. Why vacuum tubes?

f. Spell out competency on test gear as appropriate.

g. Where are CR tubes covered?

h. Stress I/O devices re: digital appl's.

3. Summary impression:

All were very competent technically, understand the mission & training of technicians.

Western Electric (1st mtg.)
Computer Specialists

1-(12?)-83

1. Meeting setting-

Primarily w./ computer technicians.
Informal; ie, "give us your opinion of the curr."

2. Significant suggestions & recommendations.

a. Try to give in-depth language trng.

b. If possible, give two languages.

c. Assure concept of sub-routines.

d. ME's ideally should be capable in AC-DC, basic electronics would be helpful.

e. Stress problem-solving techniques.

3. Summary impression:

Two very able young engineering technicians. Solid recommendations in computer technology.

Western Electric (2nd mtg.)
CAD/CAM Splsts.

1-(26?)-83

1. Setting-

Informal. Messrs. _____ & _____ gave overview of CAD/CAM re: Western Electric.

2. Significant items & suggestions:

a. Need 40 hrs. to become familiar w. C.A.D.

b. Need 3-D capability if possible.

c. Draftsman "profile" in C.A.D. shop:

(1) Produce "prod." dwgs.

(2) Detail eng. model for C.A.M. programming

(3) Produce shop aids from 2D dwgs.

(4) Possibly produce IPB's.

3. Summary impression.

Very cooperative, Well do "guest lectures," etc. Will become involved further.

T. R. W.
M.E. Splst.

1-24-83

1. Setting-

Mr. Shore gave opinion of curr., particularly M.E. production option.

2. Significant items & suggestions.

a. Corroborated electricial need to level of reading schematics and basic elect-knowledge.

b. Asked if one graphics course was adequate.

c. Emphasized need for in-depth knowledge of materials and applications.

d. Stressed need to tailor electives and splty courses to local needs.

3. Summary impression:

Very supportive of effort, willing to become involved if needed.

Augusta Newsprint
All Disciplines

1-20-83

1. Setting-

   Messrs. Bob Rickman and Jim Aspenwall in informal session.

2. Significant items & suggestions:

   a. M.E. w./out competent elect. background is a "dying breed" at Augusta Newsprint.

   b. Would consider our grad M.E. or E.M.T. over <u>almost any other technician</u>!

   c. If hired, would be worth $5000/yr. more than others.

   d. Multi-skill w. force means 50 at Abitibi vs. 300 at Continental Can!

   e. Only <u>3</u> top-notch instrumentation techs at Aug. Newsprint.

   f. Formerly 90% of jobs could be done with only <u>mech.</u> skills + 10% elect. That <u>has reversed</u>!

   g. In a parallel way, an engr. or lead tech, could take mech tech and do 90% of tasks. Now he can only do 10% with same crew!

   <u>Conclusion</u>: High level tech needed with elect skills!

3. Summary impression:

   Very interested & will contribute further if asked.

Scientific Atlanta
M.E. Splst.

1- 7 -83

1. Setting-

Jeff Hammett, very informal. Discussed role as primarily mech research and routine mech. maint.

2. Significant items & suggestions:

a. Should be good in basic elect. & nice to have some electronics knowledge.

b. Should possess solid basic mechanics, to include:

lubes, seals, drives, cylinders, etc.

c. Should be able to design, assemble, and test simple machines (like his homemade "pick & place robot")

d. Should be able to [illegible] simple mechanical problems & make needed modifications (such as minor conveyor deficiencies, etc.).

3. Summary impression:

Very able young M.E. tech. Willing to work directly on courses, etc, further.

Scientific Atlanta
E.E. Splst.

1- ? -83

1. Setting-

Meeting with Mr. Jim Farmer, E.E. Ga Tech. Well organized, thorough analysis of curr.

2. Significant items & suggestions:

a. Spell out use of test gear & competency level associated.

b. Curr. perhaps to amtitious!

c. Make aware of, and give actual work on, micro components.

d. Why any vacuum tubes? (or, only mention).

e. Need "hands-on" skills.

3. Summary impression:

Excellent job of reviewing! Will assist again as needed.

Scientific Atlanta
E.E. Splst.

1- ? -83

1. Setting-

Messr. Mendil & _____ met with us to discuss general E.E. based courses.

2. Significant items & suggestions:

a. Need soldering and other psychom. skills.

b. Assure competencies on test gear.

c. Incorporate problem solving throughout curr.

d. Instill "quality awareness" throughout courses.

e. Be sure to bring in experts who will relate various tasks to "real world."

f. Try to get people to estimate outcomes! (Good ideas) (Could save inestimable work & wrong solutions).

3. Summary impression:

Very helpful, added many down-to-earth ideas for teaching.

Rockwell
CAD/CAM Splty.

1- ? -83

1. Setting-

Met in a G.A.D. room w. Messrs _____ and _____.

2. Significant items & suggestions:

a. C.A.D. intro needs 40 hrs. + practice.

b. Easier to take "new-hire" than to retrain old trad. engrs.!

c. 3-D modeling is needed, particularly in design work.

d. Same draftsman profile as Western Elect (see W. E. file)

e. CAD/CAM tends to close breach bet. design & mfg. engrs.

f. Dist. sys. probably best, but several stand-alones O.K.

3. Summary Comments:

Very cooperative. Got "old hand" experience & young experience input. Will help as needed.

APPENDIX G

Workshops Proposed To
Meet Needs
Identified by Research

STAFF DEVELOPMENT REQUEST FY'84

tted by: Robert Mabry Program Area: High Technology Date: 3/11/83

	Conducting Institution Recommended	*Beginning & Ending Dates	Funding not Required/ Request for SDJ Approval Only
Electro Fiber Optics	GSU (A 2-day seminar to be conducted in the facilities of Bell Laboratories. Subject matter to include theory of operation and applications of fiber optics in the communications industry.) For High Technology Instructors in electronics and electromechanical technology programs.	26 people 2 days 6 hours per day	Funding is required by the staff development formula.
Lasers-Laser Optics	GSU (A 2-day workshop in a major industrial plant such as Lockheed-Georgia Company. Material to cover theory of lasers, their use in measuring and cuting, interfaces and other applications.) For High Technology Instructors in electronics and electromechanical technology programs.	26 people 2 days 6 hours per day	Funding required by staff development formula.
Applications in Industrial Plastics	GSU (A 2-day seminar to be conducted in a major industrial plant such as Grumman. Subject materials to include thermo-sets, laminates, fiberglass, graphite, boron, kevlar and other materials; also thermowelds.) For High Technology Instructors in mechanical technology programs.	18 people 3 days 6 hours per day (Exact dates to be determined.)	Funding is required by the staff development formula.

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TE: ERIC nding is available for any staff development before July 1, 1983, therefore no requests should be submitted for workshops in June.

2/83

STAFF DEVELOPMENT REQUEST FY'84

ted by: Robert Mabry Program Area: High Technology Date: 3/11/83

	Conducting Institution Recommended	*Beginning & Ending Dates	Funding not Required/ Request for SDC Approval Only
Metallurgy	GSU (A 1-day workshop to be conducted in a major industrial plant such as Pratt and Whitney. Subject materials should include new alloys, powdered metals, new testing methods, new techniques of predicting, preventing, and treating corrosion.) For High Technology Instructors in mechanical technology.	18 people 1 day 6 hours per day (Exact dates to be determined.)	Funding is required by the staff development formula.
Microprocessor Based Dedicated Controllers	Southern Technical Institute. Material to cover dedicated controllers based upon microprocessor chips widely used to replace discrete logic circuits in industry for process control; single-chip controllers used in robotics, computer peripherals, instrumentation and applicances. Activities will include the design and development of a micro-based dedicated controller by each participant which they will retain for their own school. (For high technology electronics program instructors.)	5 days 10 participants 8 hours per day Cost:$10,000. Request two seminars for total cost of $20,000.	

E: ERIC ding is available for any staff development before July 1, 1983, therefore no requests should be submitted for workshops in June.

STAFF DEVELOPMENT REQUEST FY'84

ted by: Robert Mabry Program Area: High Technology Date: 3/11/83

	Conducting Institution Recommended	*Beginning & Ending Dates	Funding not Required, Request for SDU Approval Only
Digital Devices	GSU (A 2-day seminar to be conducted in a major industry setting such as Bell Laboratories. Subjects to include programmable controllers, electromechanical devices, DC stepping drives, frequency controlled AC devices, newest fluid devices and digital interfaces.) For High Technology Instructors in electronics, electromechanical and mechanical technology programs.	30 people 2 days 6 hours per day	Funding is required by staff development formula.
Computer Languages Related to I/O Devices and Their Uses	GSU (A 3-day seminar for high technology instructors in electronics, electromechanical and mechanical technology programs. Materials to include PASCAL, APT, FAPT, and other higher level, machine and assembly languages.)	30 people 2 days 6 hours per day	Funding is required by staff development formula.
Feedback Systems	GSU (A 2-day workshop in a major industrial plant. Subject matter includes lasers, electronic, electrical and mechanical feedback systems, servo motors, feedback loops and sensing devices, applications and options.) For instructors in electronics, electromechanical, and mechanical technology programs.	30 people 2 days 6 hours per day	Funding required by staff development formula.

E: ERIC nding is available for any staff development before July 1, 1983, therefore no requests should be submitted for workshops in June.

STAFF DEVELOPMENT REQUEST FY'84

ted by: Robert Mabry Program Area: High Technology Date: 3/11/83

e	Conducting Institution Recommended	*Beginning & Ending Dates	Funding not Required/ Request for SDJ Approval Only
Industry Seminars	CSU Place funds in the staff development grant to provide the capability of sponsoring high tech instructors in electronics, electromechanical, and mechanical programs to attend applicable industrial workshops and seminars during FY-1984. Most such opportunities are announced not more than 90 days in advance and cannot be preplanned. Funds would be used to pay costs incurred by 30 instructors to attend one such seminar during the year at an estimated cost of $500. each.	To be announced.	$15,000

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E: ERIC ding is available for any staff development before July 1, 198; herefore no requests should be submitted for workshops in June.

2/83