This is to certify that the

dissertation entitled

Feasibility Study, Program Revision, and Curriculum Development for a Mechanized Agriculture Program in an Urban California Community College

presented by

Thomas Anthony Visosky

has been accepted towards fulfillment
of the requirements for

Ph.D. degree in Agricultural Engineering Technology

Thomas H Burkhardt
Major professor

Date June 12, 1989

FEASIBILITY STUDY, PROGRAM REVISION, AND CURRICULUM DEVELOPMENT FOR A MECHANIZED AGRICULTURE PROGRAM IN AN URBAN CALIFORNIA COMMUNITY COLLEGE

By

Thomas Anthony Visosky

A DISSERTATION

Submitted to
Michigan State University
in partial fulfillment of the requirements
for the degree of

DOCTOR OF PHILOSOPHY

in

Agricultural Engineering Technology

Department of Agricultural Engineering

1989

ABSTRACT

FEASIBILITY STUDY, PROGRAM REVISION,
AND CURRICULUM DEVELOPMENT
FOR A
MECHANIZED AGRICULTURE PROGRAM
IN AN URBAN CALIFORNIA COMMUNITY COLLEGE

By

Thomas Anthony Visosky

PURPOSE

The purpose of this study was to apply current curriculum development practices by analyzing industry and market needs; and to modify an existing Mechanized Agriculture Program and its curriculum to meet the needs of the agricultural, industrial, and landscape businesses in the surrounding community.

PROCEDURE

Increasing urbanization, encroachment of industrial and commercial developments, along with advancements in technology contributed to the need for re-evaluation of the traditional Mechanized Agriculture Program at Mt. San Antonio Community College in Walnut, California.

An established jury of experts at a preliminary planning session developed a direction for the revision process. A quantitative mail survey was conducted. The

survey data were coded and processed using a mainframe computer utilizing a statistical software package designed for social sciences. The data was analyzed by frequency distribution and Chi-squared statistics, as appropriate. The jury of experts determined the survey results to be both valid and adequate to warrant program revision and curriculum development.

CONCLUSIONS

The conclusion to modify the existing Mechanized Agriculture Program and rename it the Equipment Technology Program was based on: Projections that the conversion of agriculture land to urban land would continue to increase; the existing program was inadequately serving the changing employment market; no competitive program was within the 20-mile radius of Mt. San Antonio College; analysis of the survey results warranted program revision and curriculum development; and the predominate agriculture based industry was related to landscape and nursery management.

The Equipment Technology Program was designed to offer an Associate in Science degree and two certificate options: Equipment Technology and Landscape Equipment Technology. Curricula were developed to fit the needs of the surrounding industry and community. Final approval for the program revision and curriculum was granted in April, 1988 by the Mt. San Antonio College Curriculum Committee. Implementation

began September 1988. Recommendations for further study were reported.

Approved by:

Thomas H Burkhardt
Major Professor

Larry Segerlind
Department Chairperson

ACKNOWLEDGMENTS

I wish to express my gratitude to Dr. Thomas Burkhardt and to Dr. Harry Gardner for their "long distance" support and direction.

Special appreciation goes to Herman W. Weskamp for giving me the guidance and motivation to pursue a teaching career.

Sincere thanks is given to Larry Monson for his friendship and to the many unnamed people who have contributed assistance and advice towards the completion of this dissertation.

I am most grateful to my wife, Mary Lou, for her love, encouragement, and dedication. Also, to Tom, Katie, Steven, Jeff, Wes, Kathyrn, Dad, and Terry. I love you all!

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF ABBREVIATIONS

A.S.	--	Associate in Science
ASSIST	--	Assistance
COMM	--	Commercial
CONTRACT	--	Contractor
CSU	--	California State University
DRAIN	--	Drainage
ELECT	--	Electric
EQUIP	--	Equipment
EXPER	--	Experience
FIN	--	Financial
IRRIG	--	Irrigation
LAND	--	Landscape
LIT	--	Light
LRG	--	Large
MAINT	--	Maintenance
MECH	--	Mechanics
MED	--	Medium
MSAC	--	Mt. San Antonio College
MT.	--	Mount
OPER	--	Operators
RES	--	Residential
SCAC	--	Southern California Association of Governments

SCHOLAR	--	Scholarship
SHOOT	--	Shooting
TRAC	--	Tractor
UC	--	University of California

I. INTRODUCTION

Innovations in agriculture occur daily. As times, ideas, and lifestyles change -- so must agriculture education. Educators must provide students with an awareness of the changing shape of agriculture and introduce them to the "non-traditional" aspects of the industry and environment they will be serving.

Throughout history, post-secondary institutions have responded to the training needs of business and industry. The greatest strengths of the California community college system are its diversity, accessibility, and its ability to meet local community needs, while at the same time serving as the State's largest provider of post-secondary education.[1] The underlying question that educators in community colleges and technical institutes must answer concerning change according to Grubb is: "How can we be sure to meet the needs of the federal government, the community, and the individual?"[2] In the ongoing process of

---

[1]California, Department of Education, Commission For The Review Of The Master Plan For Higher Education, The Challenge of Change, A Reassessment of the California Community Colleges, March 1986, p. 3.

[2]W. Grubb, "The Bandwagon Once More: Vocational Preparation for High-Tech Occupations," Harvard Educational Review 54 (1985): p. 429.

meeting and adjusting to these needs, the field of Mechanized Agriculture has maintained its emphasis of fundamental competencies.

Southern California Community College Mechanized Agriculture Programs and curricula need to be reviewed continually and revised to meet the demands of growing technology and regional vocational conditions.

The Mechanized Agriculture Program at Mt. San Antonio Community College in Walnut, California has been faced with the obstacles of decline in enrollment, agricultural industry, and agricultural work experience opportunities. Not withstanding the fact that traditional agricultural industries have diminished in the Mt. San Antonio College service area, rapid changes in technology and urbanization have created a demand for skilled equipment technicians who participate in the marketing, operation, service, and maintenance of equipment necessary for the industrial and landscape businesses.

1.1 PURPOSE OF THE STUDY

The purpose of this study was to apply current curriculum development practices by analyzing industry and market needs; and to modify an existing Mechanized Agriculture Program and its curriculum to meet the needs of the agricultural, industrial, and landscape businesses in the surrounding community.

1.2 BACKGROUND AND NEED FOR THE STUDY

Many post-secondary two-year institutions offering agricultural programs throughout the State of California in the 1980s had to face the dilemma of urbanization. This urban explosion occurred for a number of reasons, but according to sociologist, John J. Palen, the five most important factors were the following:

1. A rapidly growing population,
2. Scientific management of agriculture,
3. Improved transportation and communication,
4. Stable political governments, and
5. The development of the industrial revolution.[3]

Mt. San Antonio College is one of 106 community colleges within the State of California educational system. Sixty-six of the colleges are located within the southern half of the state.[4] Geographically, Mt. San Antonio College is located in Southern California within the boundaries of Los Angeles county, in the city of Walnut. It is just twenty-five miles east of Los Angeles (see Appendix A). The Mt. San Antonio Community College District encompasses a 10-mile radius of the school facility (see Appendix B).

The Mission Statement of Mt. San Antonio College as written in the catalog states:

---

[3]John J. Palen, The Urban World (New York: McGraw Hill Book Co., 1981), p. 6.

[4]California Association of Community Colleges, California Community College Directory, (CACC Press, 1988), p. 1.

The Mt. San Antonio Community College District is dedicated to serving a diversified and changing population through excellence in teaching and in support services. The College, an integral part of the community, meets the educational needs and aspirations of the people it serves. The primary purpose of Mt. San Antonio College is to offer high quality, comprehensive, and flexible programs designed to develop personal, academic, and/or job-related skills to all adult members of the Mt. San Antonio College District and to those especially qualified by law who are able to benefit from the programs and services. The four major instructional programs are:

A. **Transfer:** lower division courses including preparation for a major, liberal arts, and general education requirements transferable to four-year colleges and universities.
B. **Occupational:** preparation for career entry, re-entry, and job upgrading in vocational (technical and para-professional) careers or in vocational areas which lead to certification, licensure, transfer, career, or self employment.
C. **Remedial:** curricula designed to increase students' reading, writing, and computational skills to move them to a more functional level.
D. **Community Education:** courses and other services designed to assist community members in becoming informed and responsible citizens, enlightened participants in cultural and recreational activities, and sensitive human beings in relationships to each other.[5]

Mt. San Antonio College is fully accredited by the Western Association of Schools and Colleges, the University of California, and Board of Governors, California Community Colleges. The College is fully authorized to offer courses which parallel the first two years of the state

---

[5]Mt. San Antonio College Catalog, (1987), p. 1.

universities' and colleges' curricula and which qualify a student for the university.[6]

The College, including the Agricultural Sciences Department, was founded in 1946. Agricultural Engineering courses and degrees were first offered in 1952. Its curriculum was designed to articulate with those offered in the lower division by the Universities of California and the California State Universities.[7]

During the 1950s, the Agricultural Sciences Department offered two separate curricula in Agricultural Engineering, Vocational and California Polytechnic Transfer. The Vocational option was designed to teach skills necessary for the operation of a modern mechanical farm. The California Polytechnic Transfer option was designed to prepare students for a four-year college leading to a Bachelor of Science degree in Agricultural Engineering. The core courses were Agricultural Mechanics and Farm Machinery[8] (see Appendix C).

During the 1960s, the Agricultural Sciences Department offered the option of Agricultural Engineering (California State Polytechnic College Transfer) or Agricultural Mechanics (Vocational). The Agricultural Engineering curriculum was modified to be more technically oriented and the curriculum was modified to include more specific crop, horticulture, and animal production courses. The core

---

[6]Ibid.

[7]Mt. San Antonio College Catalog, (1950), p. 43.

[8]Ibid.

courses remained the same for both options with the addition of a Farm Tractors course[9] (see Appendix D).

During the 1970s, the Agricultural Mechanics (Vocational) Program title was changed to Agricultural Engineering Technology. Two courses were added to the Agricultural Engineering Technology Program: Agricultural Mechanization and Internal Combustion Engines. The Agricultural Engineering transfer curriculum remained the same as the 1960s[10] (see Appendix E).

During the 1980s, the Agricultural Engineering Technology Program title was changed to Mechanized Agriculture. The core courses remained the same as in the 1970s, but a certificate in Power and Machinery was added. The Agricultural Engineering transfer program was no longer offered as an option[11] (see Appendix F).

In a personal interview, Mr. Herman W. Weskamp, Agricultural Engineering Instructor at Mt. San Antonio College from 1952-1980, gave an historical overview of the demographics and focus of the agricultural students during his tenure. As an instructor Mr. Weskamp noted:

> During the 1950s, students came primarily from farms in the immediate surrounding area. Many transferred to four-year institutions or went directly into self-employment or family farms.

---

[9]Mt. San Antonio College Catalog, (1960), p. 42.

[10]Mt. San Antonio College Catalog, (1970), pp. 71, 76.

[11]Mt. San Antonio College Catalog, (1981), p. 56.

> During the 1960s, rapid urbanization occurred. The population influx was mainly from the midwest farm belt. The students were from families adjusting to suburbia, and the students themselves were anxious to get back to the "basics" of farming. Employment opportunities began to shift from self-employment to working as employees in agriculture-based businesses. Few students transferred to four-year institutions.
>
> During the 1970s, the majority of students were mostly urban raised with farm background two generations removed. Because of the technical advancements in the past two decades, high skill and specialization training were essential. Students transferring to four-year programs was high. Agriculture industries also were experiencing urbanization demands and began handling industrial services and supplies. Employment opportunities continued to be self-employment and working as employees for agriculture-based businesses with the addition of working in related industries.[12]

During the 1980s, the mechanized agriculture student's background was primarily urban in nature. The Mt. San Antonio College District in 1986 had an estimated population of 665,106 with approximately 203,503 households.[13] For a population comparison table of the Mt. San Antonio College District cities see Appendix G. Few students in the 1980s transferred to four-year institutions. Employment shifted to urban industries with some opportunities in self-employment and agricultural sales and service.

Review of the Mt. San Antonio College Office of Admission and Records, enrollment census correlates with Mr. Weskamp's observations. The student enrollment at Mt.

---

[12]Personal interview with Herman W. Weskamp, Professor Emeritus, Mt. San Antonio College, Walnut, CA, 10 November 1987.

[13]Mt. San Antonio Community College Information Notebook, Vol2, (1985), p. 21.

San Antonio College increased from a total enrollment of 888 students in 1950 to 19,213 in 1980. At the same time, the enrollment in the Agricultural Sciences Department increased from 198 students in 1950 to 1,355 in 1980. These statistics show that 22 percent of the student body in 1950 were agriculture students compared to only 7 percent in 1980.[14] No comprehensive statistics about enrollment in specific majors or certificate programs were recored by the College or the Agricultural Sciences Department.

During the period of 1950 to 1980, the surrounding service area for Mt. San Antonio College experienced a transition from a rural farm community to an industrial and commercial center for the East San Gabriel Valley which is located in the northeastern section of Los Angeles County. Census data reviewed from the United States, Department of Commerce, Bureau of Census provides additional insight into the trend toward industrial and commercial use of land. The number of acres devoted to agriculture in Los Angeles county during these years decreased by 57 percent while at the same time the number of manufacturing establishments increased by 122 percent. From 1950 to 1980, housing within the Los Angeles County area increased by 89 percent.[15] This increase confirmed the trend away from utilization of land

---

[14]Mt. San Antonio College, Office of Admissions and Records, Enrollment Census: 1950-51, 1960-61, 1970-71, and 1980-81.

[15]U. S. Department of Commerce, Bureau of the Census, Characteristics of the Population, 1950, 1960, 1970 and 1980.

for agricultural production and into residential, industrial, and commercial use. Table 1 projected that the percentage of urban land and the population would continue to grow in the college district and in adjacent subregions.

The dramatic reduction in the number of acres devoted to agricultural production resulted in a shift to new agricultural products. As reported in the San Gabriel Valley Tribune: "The biggest remaining form of agriculture in the San Gabriel Valley is the nursery-based production of ornamental plants and trees."[16]

Since its beginning in 1952, the Mt. San Antonio College, Agricultural Engineering Program experienced three program title changes but only minor changes in its core curriculum and focus of serving the agricultural industries. During the same time, the surrounding service area of the college underwent major changes with increasing urbanization, encroachment on the farmland by industrial and commercial establishments, and the popularity of the landscape industry. Consequently, by the late 1980s the question of whether or not the existing program entitled Mechanized Agriculture was adequately serving the changing community became apparent.

In response to the question posed above, three options were available: 1) Develop a new program, 2) Modify the existing program, or 3) Cancel the existing program. In

---

[16]"Taking Stock of the Valley's vanishing agriculture," San Gabriel Valley Tribune, 11 May 1988 Sec. D, p. 1.

Table 1. -- Growth Forecasts For Mt. San Antonio College District And Adjacent Subregions

Highly Urbanized	Year 2000 % Urban Land	1980	2.000	Population Growth	Average Annual % Growth Rate
East San Gabriel Valley	67.1				
Population		687,000	787,000	100,000	0.07
Housing		220,000	275,000	55,000	1.20
Employment		260,000	331,000	71,000	1.40
Glendale/Pasadena	76.0				
Population		1,130,000	1,202,000	72,000	0.30
Housing		430,000	485,000	55,000	0.60
Employment		494,000	567,000	73,000	0.70
North West Orange	86.3				
Population		1,354, 000	1, 591,000	237,000	0.90
Housing		487;000	596,000	109,000	1.10
Employment		635,000	836,000	201,000	1.60
Urbanizing					
Chino Basin	62.0				
Population		346,000	695,000	349,000	5.00
Housing		119,000	255,000	136,000	5.70
Employment		117,000	275,000	158,000	6.80
Riverside/Corona	28.0				
Population		334,000	574,000	240,000	3.60
Housing		118,000	219,000	100,600	4.20
Employment		109,000	219,000	109,700	5.00
Mountains/Desert					
Angeles/San Bernardino Forest	3.5				
Population		38,400	58,000	19,600	5.20
Housing		39,200	62,500	23,300	3.00
Employment		8,100	14,100	6,000	3.70

Source: SCAG 1982, MSAC Institutional Research

order to implement a new program, examination of the new program and comparison of it to the community college and statewide master plan had to be completed. Additionally, studies relating job market analysis, enrollment projections, library resource availability, facilities, and equipment required to intitiate and sustain the program had to be completed. Further review of faculty availibility and financial support had to be presented to the Chancellor of California Community Colleges prior to approval of a new program.[17]

Modification of an existing program, required only approval at the local community college by the District's Curriculum Review Committee. The approval process necessarily required some of the same information as that required to implement a new program. The focus of review was primarily concerned with market demand for competency skills within the modified program. Budget analysis and comparison of the modified program to the district and statewide master plans were eliminated.[18]

An advisory board with representatives from industry and education was set up to provide input and advice for reviewing and modifying the Mechanized Agriculture Program. This board was used as a jury of experts for this study and it is described in more detail in Section 3.1., p. 38,

---

[17]California, Department of Education, Title 5, Assembly Bill 1725, 1986.

[18]Ibid.

Given the time constraints imposed by Mt. San Antonio College in keeping with the requirements of Title 5 of the California Educational Code, the unavailability of funding for a new program and the narrow scope of the study; the jury of experts concluded that modification of the existing program was the only feasible method for applying the study results. The jury of experts recommended implementing the study findings and modifying the existing program at Mt. San Antonio College to obtain immediate quantitative and qualitative analysis of the validity of the program findings in a real life application.

Accordingly, the jury of experts believed that factors of market demand for technological skills should be examined rather than student demand when developing an accurate and effective research model. Such an approach gives due consideration to the Mission Statement of the Mt. San Antonio Community College District to: " . . . offer high quality, comprehensive, and flexible programs to develop personal, academic, and/or job-related skills to all adult members of the district."[19]

1.3 OBJECTIVES

The major purpose of this study was to apply a vocational education method of modifying a curriculum.

---

[19]Mt. San Antonio College Catalog, (1987), p. 1.

This study emphasized two of the four principles of curriculum development--Analysis and Design.[20] Objectives one through four utilized analysis to establish need indentification. Objectives five and six responded to the needs through design.

The specific objectives were to:

1. Determine the necessity and potential of updating and modifying the Mechanized Agriculture Program.

2. Develop a survey to obtain data to determine the following:

   A. The business types surveyed.

   B. The subfields of the business types surveyed.

   C. The type of equipment technicians employed in the surveyed area.

   D. The desired educational level of equipment technicians and which levels demonstrate more productive employees.

   E. An average starting salary of an equipment technician.

   F. Whether or not the employer would like a training program for current employees.

   G. The preferred time of day and duration of term for classes to be offered to meet the work schedules of existing employees.

   H. Whether the employer would prefer an associate degree or a certificate program.

   I. Which specific technical skills would be needed for an equipment technician.

---

[20]Joseph C. Bondi and Jon Wiles, Curriculum Development: A Guide to Practice, 2nd ed., (Columbus: Charles E. Merrill Publishing Co., 1984) p. 3.

J. Whether or not industry would be willing to support the proposed program through donations, scholarships, and/or work experience.

K. Whether or not the employer would be willing to serve as a member of an equipment technology advisory committee.

3. Identify the power and machinery competency needs within the urban community.

4. Assess the existing program and its ability to satisfy competency needs of the urban employment market.

5. Design and develop modifications to the existing Mt. San Antonio College Mechanized Agriculture Program to conform with urban employment and market demands as demonstrated by research and survey findings.

6. Develop and/or revise course content that corresponds with program modifications.

1.4 ASSUMPTIONS

The following assumptions were made in developing the study:

1. In order to prepare students for the employment market place, education programs must relate to the needs of industry.

Connelly and Saxton in 1982 recognized this relationship and stated that:

> To properly assess the labor market for local occupational program planning a survey of employers within the labor market is necessary to confirm the existence of job opportunities and to verify the precise skills, knowledge, and aptitudes required.[21]

2. Equipment used in industry today is highly technical, resulting in a demand for educated and skilled equipment technicians.

Powers, Powers, Betz, and Aslanian noted that:

> Technological change is an ongoing phenomenon, and as it continues -often rapidly- it creates needs for constant retraining. Both the demand for training to develop new skills in employees and the demand for periodic updating of those skills must determine the content of programs offered to help employers adapt to technological change.[22]

3. In updating for advanced technology, it is essential to continue to offer students the fundamental competencies.

Groves described changes that are needed in community and technical college curricula:

> Today's equipment is a combination of electrical, mechanical, fluid, thermal, optical, and microcomputer applications. The operation and repair of this

---

[21]Catherine Connelly and Steven Saxton, How to Develop and Use Labor Market Information in Local Occupational Program Planning, (California: California Occupational Information Coordinating Committee, 1982), p. 44.

[22]David R. Powers et al., Higher Education in Partnership with Industry, (San Francisco: Jossey-Bass Publishers, 1988), p. 36.

equipment will be impossible without some knowledge of basic principles in all these areas.[23]

4. **Equipment dealerships; municipalities; golf courses; local school district maintenance divisions; building, excavation, and landscape contractors; and utility companies are a representative sample of the employment market in a Mechanized Agriculture Program.**

Upon the recommendation of the jury of experts, the above mentioned business types were examined due to their utilization of similar mechanical and operational skills.

5. **The majority of employment and work experience opportunities would draw from an approximate 20-mile radius of Mt. San Antonio College in Walnut, California.**

The Mt. San Antonio College District encompasses a 10-mile radius of the campus. It was the recommendation of the jury of experts to increase the radius to twenty miles to incorporate a broader representative sample of the employment market. Borg and Gall stated that: . . . "as a general rule use the largest sample possible."[24] Mt. San Antonio College is located near four freeway systems making the campus easily accessible within this 20-mile radius.

---

[23]C. L. Groves, "Quantum Leap: Vocational Education Reform," American Association of Community and Junior Colleges (Mar. 1985) pp. 42-45.

[24]Walter R. Borg and Meredith D. Gall, Educational Research, An Introduction, 2nd ed., (New York: David McKay Co., Inc., 1976) p. 188.

6. **This study could be applicable in other two-year post-secondary institutions in urban areas.**

As described in Section 2.1, p. 21, by the Board of Governors of the California Community Colleges, the fundamental goals of vocational education include the continual assessment of current educational programs. Two-year institutions that have similiar programs could utilize the process and recommendations of this study to assist in the modification and development of their programs.

1.5 LIMITATIONS

The following limitations were identified for conducting this study:

1. **The evaluation process was limited to a single program to narrow the scope of this study.**

2. **The study focused on one community college in the city of Walnut, within the San Gabriel Valley, Los Angeles County, California because each community college district and service area has specific demographic needs.**

3. **The Mt. San Antonio College District encompasses a 10-mile radius. An approximate 20-mile radius of the college campus was utilized in order to more accurately determine the market demand for**

equipment technician competency needs of the immediate market surrounding Mt. San Antonio College. (see Appendices A and B).

4. Evaluation of the survey results was subject to a time constraint of sixty days due to the curriculum review deadline at Mt. San Antonio College as mandated by the State of California.[25]

---

[25]California, Department of Education, Title 5, Assembly Bill 1725, 1986.

II. REVIEW OF LITERATURE

Publications related to the study were selected and discussed under seven sections in this chapter. The first section deals with the role of the California community colleges, including a brief history and primary functions. The second defines the role of vocational education and its fundamental goals. The third reviews Southern California community college catalogs to establish which colleges have mechanized agriculture or equipment type courses, certificates, or degrees. The fourth reviews other studies. The fifth section reviews research methodology which covers: the steps in research, measurements in research, and approaches to data collection. The sixth gives a historical overview of curriculum development in the twentieth century. The seventh section summarizes the chapter.

2.1 ROLE OF THE CALIFORNIA COMMUNITY COLLEGES

Since the early 1900s, the California community colleges have been a gateway to opportunity for millions of Californians. By 1960, there were 66 campuses with a total enrollment of over 340,000 students. By 1986, there were

106 campuses whose combined enrollment equaled over a million students.[1]

The California Community College Master Plan assigned the following primary functions to the community colleges:

> . . . to provide instruction in the first two years towards an undergraduate degree, with the expectation that students in this course of study would transfer to a four-year college or university; and to provide vocational and technical training leading to employment for students who did not pursue college degrees.[2]

Over the years, rapid demographic and societal changes have brought more diversity. By the late 1980s, the community colleges offered language and citizenship training, basic education skills, and cultural enrichment for their communities, in addition to offering courses within their original transfer and vocational functions.[3]

2.2 ROLE OF VOCATIONAL EDUCATION IN CALIFORNIA COMMUNITY COLLEGES

Doctor Barlow, Professor Emeritus, University of California Los Angeles, defined Vocational Education as:

> . . . a social process concerned primarily with people and their part in doing the work that society needs done; it is concerned with preparing

---

[1]California, Department of Education, Commission For The Review Of The Master Plan For Higher Education, The Challenge of Change, A Reassessment of the California Community Colleges, March 1986, p. 1.

[2]Ibid.

[3]Ibid.

people for work and with improving the work potential of the labor force.[4]

The Board of Governors of the California Community Colleges established the following fundamental goals for vocational education:

1. Prepare students, through instruction, for employment in established and emerging occupations, and assist in placing students in jobs or in more advanced training.

2. Further develop systems for effective student personnel services, including occupational guidance on a continuing basis that is current as to skill needs and occupational opportunities.

3. Assist those already employed to acquire updated skills necessary to maintain their level of employment or to advance or change occupations.

4. Seek out and develop those ideas which lead to the improvement of instruction and the success of students enrolled in occupational education programs.

5. Seek out and develop through research those ideas which lead to instruction in and development of skills and proficiencies in new and emerging occupational opportunities.[5]

2.3 SOUTHERN CALIFORNIA COMMUNITY COLLEGES CATALOG REVIEW

Assuming this study reveals equipment technician competency needs within the employment market, it would then

---

[4]Gerald G. Somers and J. Kenneth Little, eds., Vocational Education Today and Tommorrow (Wisconsin: University of Wisconsin, 1971), Chapter 2, Changing Goals, by Melvin L. Barlow, p. 11.

[5]California, Department of Education, Planning Committee on Vocational Education, The California Five-Year State Plan For Vocational Education, Vol. I, 1977 p. 24.

be relevant to review existing mechanized agriculture and related area course programs from other schools to determine applicability to the Mt. San Antonio College program. Accordingly, for this study, catalogs of the sixty-six Southern California community colleges were reviewed to establish which colleges offered associate degrees, certification, or support courses in mechanized agriculture or equipment related fields.

Twenty-two colleges were found to offer the established criteria. Five colleges offered support courses, two offered certification programs, six offered degree programs and nine offered both certification and associate degree programs in mechanized agriculture or equipment related fields. Appendix H contains Table A.2 which summarizes the catalog content review for the twenty-two colleges.

2.4 REVIEW OF OTHER STUDIES

A review of abstracts of other research studies was conducted, using the libraries at the Univeristy of California, Los Angeles, California Polytechnic State University, Pomona, and Mt. San Antonio College, Walnut. The resources investigated and reviewed were:

1. Dissertation Abstract International
2. Educational Resources Information Center (ERIC)

Other resource avenues utilized were:

1. Vocational and Occupational Information Center for Educators (VOICE)

2. Michigan State University, College of Agriculture Library's collection of dissertations and theses.

Each resource was investigated under the following topics. Each topic was reviewed to determine whether or not it was relevant to the revision of a program in an urban environment.

1. Agricultural Program Development
2. Agricultural Curriculum
3. Agricultural Curriculum Planning
4. Agricultural Engineering Technology
5. Agricultural Mechanization
6. Equipment Technology
7. Mechanized Agriculture

After finding that none of the above topics provided information relevant to an urban environment, an ERIC search was repeated utilizing the topics below.

1. Post Secondary Curriculum Review
2. Post Secondary Program Review
3. Vocational Occupational Planning
4. Vocational Education Needs Assessment
5. Marketing Occupational Programs
6. Community College Curricula Research
7. Instructional Research

Studies were found that demonstrated assessments of needs and occupational competencies, development and use of market information, and curriculum development. Although none of the studies provided relevance to a mechanized agriculture or equipment related community college program in an urban area, they did provide valuable information for this study about the research process.

2.5 RESEARCH METHODOLOGY

This subsection reviews the steps in research, measurement in research, and approaches to data collection. According to Professors Adams and Schvaneveldt of Utah State University.

> Research in any field seeks to generate new information or knowledge that, in turn, improve the quality of life, and provide a better understanding of conditions in a field.[6]

The seven major steps in the research process outlined by Adams and Schvanevelt are:

1. A statement of the problem or issue is given.
2. A reduction or refinement of the problem occurs and the problem is restated with research orientation.
3. A research design is formulated and mapped out for use.
4. Ways to obtain relevant data are developed, tested, and made ready for use.
5. The data are collected in accordance with research rules.
6. The data are analyzed and results are interputed.
7. The findings are typically in a report, publication, or some other medium to communicate to or influence others.[7]

Robert Travers, Distinguished University Professor, Western Michigan University organized the process of

---

[6]Gerald R. Adams and Jay D. Schvaneveldt, Understanding Research Methods, (New York: Longman Inc., 1985) p. 12.

[7]Ibid., p. 18.

research into the development of a research plan which contained five steps:

1. **The problem.** The plan should include a clear statement of the question or questions that the research is designed to answer.

2. **The method to be used in solving the problem.** This section of the plan provides an over-all description of the approach that offers an avenue to the solution of the problem.

3. **Procedures and techniques.** Whereas the previous section describes the over-all approach to the problem, this part of the plan is concerned with the details of the techniques to be adopted.

4. **The population to be studied.** The population to be studied will depend on the population to which the results of the study are generalized.

5. **Methods to be used in processing data.** A research plan should indicate the statistical and other methods that are to be used for processing data.[8]

Research can be measured by the qualitative method and/or the quantitative method. Professor Travers, explained the basic distinction between the two methods:

> It is difficult to conceive of a scientific approach to problems that does not involve the use of measurement. When measurement is involved, it is usual to say that quantitative methods are being used, as contrasted with qualitative methods, which do not involve the use of measurements. Quite obviously, much of importance can be learned by the use of qualitative methods, but the organized body of knowledge that is called a science seems to require measurement techniques for its development. The histories of most areas of knowledge show that, in the early stages of development, knowledge is acquired by qualitative methods, without resort to measurement. Such knowledge is usually lacking in precision and often hopelessly vague, but the kernel of truth that it contains opens the way to the development

---

[8]Robert M. W. Travers, An Introduction to Education Research, 3rd ed., (New York: Macmillen, CA 1969), pp.83,84.

> of progressively more precise knowledge. . . Qualitative observations seem to be essential for the development of any branch of science, at least in its early stages, but it is ultimately careful work involving measurement that builds a science of real value.[9]

Obtaining and collecting data are essential steps in research. Adams and Schvaneveldt list and define four major approaches to obtain data:

1. **The case study approach.** This is an in-depth study of one or a limited number of cases in which each case is treated as a whole. The case study approach is particularly helpful when deeper understading is needed and when there is little concern about generalizing to a large population.

2. **The survey approach.** This collection of data is from a sample, typically a large sample, to a set number of defined questions. The survey sample is usually a cross-section of a stated population, with the emphasis on generalized statistics of the population as the outcome, not the individual, as is the focus in case studies.

3. **The cross-sectional approach.** This design presents a broad picture with analysis of a large group in regard to multiple variables. The subjects in a cross-section are studied at one point in time with no attempt to assess development change. Data in this approach are most often collected by interview, questionaire, or telephone contact.

4. **The longitudinal approach.** An individual or small number of units are studied over a period of time. The goal of this approach is to describe or measure the change or development of some process. This approach provides high control over variables and is the design to use when the primary goal is to understand change or development patterns.[10]

---

[9]Ibid. p. 87.

[10]Adams and Schvanevelt, Understanding Research Methods, p. 117.

The survey is a common tool in research. Travers wrote:

> Surveys are conducted to establish the nature of existing conditions. A school survey is commonly conducted in order to determine which services the school can render its community or perhaps to compare these services with those that are provided by other schools.[11]

A basic distinction also exists between the qualitative survey and the quantitative survey. Qualitative implies a relatively small number of cases, an informal interview consisting of mostly open-ended questions, and a non-statistical approach to the collected data. Quantitative, on the other hand, seeks to count or quantify the data and normally applies some statistical form of analysis. This type of survey uses a large and representative sample, as well as a standardized questionnaire with mostly precoded questions.[12]

As written by Borg and Gall: "Data-collection tools are used in survey research to obtain standardized information from all subjects in the sample."[13] The three most common methods of survey or data collection are the following: (1) personal interviews, (2) telephone interviews

---

[11]Travers, An Itroduction To Education Research, p. 185.

[12]Robert Ferber, Handbook of Marketing Research, (New York: McGraw Hill Book Co., 1974) Section II, Part B, Survey Design, by Paul B. Sheatsley, p. 66.

[13]Borg and Gall, Educational Research, An Introduction, p. 188.

and (3) mail surveys.[14] According to a widely-recognized expert in market research, Paul Erdos:

> In planning a survey, the researcher must decide which data collection method is most appropriate and applicable to the particular problem at hand, can achieve the most complete and most reliable results, and will best fit the available budget and time requirements.[15]

Personal interviews tend to be the most expensive on a cost-per-interview basis. The interviewer can influence results given by respondents in many different ways -- all the strengths and weaknesses of this method can be attributed to this one factor. The telephone interview is a relatively quick method for obtaining certain kinds of information since the surveyor need not arrange for appointments in advance, travel to subjects, or leave it to the subjects' leisure to mail in survey information. The telephone interview can become fairly expensive when a large, widely dispersed sample is used.

In educational research, direct mail surveys are commonly used. Paul Erdos of Erdos and Morgan, Inc., New York, wrote that the major advantages and disadvantages of mail surveys may be summarized by the following points:

Advantages:

1. Wider distribution
2. Less distribution bias
3. No interviewer bias

---

[14]Robert Ferber, Handbook of Marketing Research, Survey Design, by Paul B. Sheatsley, p. 2-77.

[15]Robert Ferber, Handbook of Marketing Research, Data Collection Methods Mail Survey, by Paul L. Erdos, p. 90.

4. Better likelihood of thoughtful reply
5. Time-saving
6. Centralized control
7. Cost saving

Disadvantages:

1. Usable mailing lists sometimes are unavailable
2. The subject matter or nature of the research may require the presence of a specially trained interviewer.
3. The questionnaire is too long.
4. The questionnaire is too difficult.
5. The information required is confidential.
6. The respondent is not the addressee.
7. The time available is not enough.
8. The problem of non-respondents must be faced.[16]

Erdos also wrote that:

> For a mail survey to be acceptable, it must be based on an adequate mailing list, use proper sampling procedure, avoid biasing the answers by anything contained in the letter or questionnaire; and, finally, achieve a high rate of response or take other steps to eliminate or reduce non-respondent bias.[17]

Questionnaire construction is an essential part of any survey. Each item on the questionnaire should be developed to measure a specific aspect of one of the established objectives. Borg and Gall emphasized that:

> ... surveys can have a variety of objectives. However, these objectives need to be identified at the outset of the study, otherwise you will find it very difficult to make sound decisions regarding selection of a sample, construction of the questionnaire, and methods for analyzing the data.[18]

---

[16]Ibid., pp. 90-92.

[17]Ibid., p. 104.

[18]Borg and Gall, Educational Research An Introduction, p. 196.

The survey developer is obliged to explain why the question is to be asked and how the responses will be analyzed. "Questions may be either in the closed form in which the question permits only certain responses (such as a multiple-choice question)," says Borg and Gall, "or in the open form in which the subject makes any response he wishes in his own words (such as an essay question)."[19] The most accurate form to use is determined by the objective of the particular question.

Paul Erdos listed the following as the main considerations in questionnaire construction:

1. The questionnaire must include questions on all subjects which are essential to the project; it should contain all important questions on these subjects, but none which are not purposeful.

2. The questionnaire should appear brief and "easy to complete". Reading it should not destroy this first impression.

3. The reader must be made to feel that he is participating in an important and interesting project.

4. The form should not contain any questions which could bias the answers.

5. It must be designed to elicit clear and precise answers to all questions.

6. Phrasing, structure, and layout must be designed with the problems of tabulating in mind. The saving of time and money in data processing should be one of the considerations.[20]

---

[19]Ibid., p. 198.

[20]Erdos, Professional Mail Surveys, (New York:McGraw Hill Book Co., 1970), pp. 37-38.

The letter accompanying the questionnaire should have the appearance and format of a personal communication. It should express simply the importance of the research project and of the subject's participation. The letter should always be truthful, and its style and tone should be acceptable to the group of people surveyed. It should be as brief as possible.

The following list compiled by Erdos, demonstrates the most important thoughts good cover letters should convey and the most important considerations in their construction.

1. Personal communication.
2. Asking a favor.
3. Importance of the research project and its purpose.
4. Importance of the recipient.
5. Importance of the replies in general.
6. Importance of the replies where the reader is not qualified to answer most questions.
7. How the recipient may benefit from this research.
8. Completing the questionnaire will take only a short time.
9. The questionnaire can be answered easily.
10. A stamped reply envelope is enclosed.
11. How recipient was selected.
12. Answers are anonymous or confidential.
13. Offer to send report on results of survey.
14. Note of urgency.
15. Appreciation of sender.
16. Importance of sender.
17. Importance of the sender's organization.
18. Description and purpose of incentive.
19. Avoid bias.
20. Style.
21. Format and appearance.
22. Brevity.[21]

Erdos also writes that:

> ...it rarely happens that all twenty-two elements mentioned above are needed or can be used. Since

---

[21]Ibid., p. 102.

> brevity is very important, we do not want to use a single sentence which does not earn its keep by serving a definite purpose.[22]

2.6 CURRICULUM DEVELOPMENT--HISTORICAL OVERVIEW

A curriculum is an organized set of formal educational and/or training objectives. Four basic principles cement the foundation of curriculum development: (1) Analysis, (2) Design, (3) Implementation, and (4) Evaluation. These principles have evolved primarily from practice. They are vulnerable to social, political, and economic influences; a non-systemantic approach to curriculum planning; and the changing priorities of education. The basic four principles have remained at the core of curriculum planning theories during the twentieth century, even though various specific theories have been presented.[23]

Subject content was the focus of early curriculum development. As written by Harold Rugg in the 1926 National Society for the Study of Education Yearbook:

> The operational tasks of curriculum development is a three step process: (1) Determine the fundamental objectives, (2) Select activities and other materials of instruction, and (3) Discover

---

[22]Ibid.

[23]Bondi and Wiles, Curriculum Development: A Guide to Practice, 2nd ed., p. 3.

> the most effective organization and placement of this instruction."[24]

By 1950, the technique above had reached refinement in Tyler's widely accepted four-step analysis:

1. What educational purposes shall the school seek to attain?
2. What educational experiences can be provided that are likely to attain these purposes?
3. How can these educational experiences be effectively organized?
4. How can we determine whether these purposes are being obtained?[25]

In 1962, Hilda Taba, a curriculum specialist, refined Tyler's procedure for developing school curriculum and outlined seven major steps:

1. Diagnosis of needs
2. Formulation of objectives
3. Selection of content
4. Organizing of content
5. Selection of learning experiences
6. Organization of learning experiences
7. Determination of what to evaluate and means of doing it.[26]

Taba describes her conception of curriculum approaches:

> Decisions lending to change in curriculum organization have been made largely by pressure, by hunches, or in terms of expediency instead of being based on clearcut theoretical considerations

---

[24]Harold Rugg, "Curriculum Making: Past and Present", 26th Yearbook, Part I of the National Society for the Study of Education (Chicago: University of Chicago Press, 1926) p. 22.

[25]Ralph Tyler, Basic Principles of Curriculum and Instruction (Chicago: University of Chicago Press, 1949).

[26]Hilda Taba, Curriculum Development: Theory and Practice (New York: Harcourt Brace Jovanovich, 1962) p. 12.

> or tested knowledge. The scope of curriculum has been extended vastly without an adequate consideration of the consequence of this extension on sequence or cumulative learning. . . The fact that these perplexities underlying curriculum change have not been studied adequately may account for the proliferation of approaches to curriculum making.[27]

Feyereisen later deals with curriculum as a more comprehensive process by approaching curriculum development as a problem-solving action chain:

1. Identification of the problem
2. Diagnosis of the problem
3. Search for alternative solution
4. Selection of the best solution
5. Ratification of the solution by the organization
6. Authorization of the solution
7. Use of the solution on a trial basis
8. Preparation for adoption of the solution
9. Adoption of the solution
10. Direction and guidance of staff
11. Evaluation of effectiveness[28]

The four basic principles that form the foundation of curriculum development: analysis, design, implementation, and evaluation are utilized in each curriculum development process listed above. The application of these four principles was pertinent at all levels of education in the 1980s and improved efforts in evaluating school programs.

Vocational and technical curriculum development differs from academic curriculum development in that it focuses upon the identification of occupational needs of a particular

---

[27]Ibid., p. 30.

[28]Kathryn V. Feyereisen, A. John Fiorino, and Arlene T. Nowak, Supervisor and Curriculum Renewal: A Systems Approach (New York: Appleton-Century-Crafts, 1970) p. 204.

locale. This specialized curriculum takes into account both academic and community needs. According to Curtis Finch and John Crunkilton, the:

> Basic characteristics of the vocational and technical curriculum include orientation, justification, focus, in-school success standards, out-of-school success standards, school-community relationships, federal involvement, responsiveness, logistics, and expense.[29]

2.7 SUMMARY

The goals of the California community college system have evolved since the 1900's to include diversified training and educational skill programs in addition to offering courses within their original transfer and vocational functions. The fundamental goals as outlined by the Board of Governors of the California Community Colleges focus on occupational training to meet occupational opportunities available within the market place.

Agricultural instruction in an urban area must adjust to community needs while maintaining a sense of balance and consistency within the national, state, and local educational systems. A study of market needs must necessarily include a review of mechanical agriculture and equipment related fields at other Southern California community colleges to reveal applicability to the Mt. San

---

[29]John R. Crunkilton and Curtis R. Finch, Curriculum Development in Vocational and Technical Education: Planning Content and Implementation (Boston: Allyn and Bacon Inc., 1979) p. 9.

Antonio College program. Similiarly, a review of other research studies was done, including subheading and subtopics discussed therein which could be helpful to discover relevancy to the present research.

A review of research processes and approaches with respect to their relative value on both the quantitative and qualitative measurement basis was made to determine the appropriate means of data collection. In order to fully utilize the data once collected, the basic principles of curriculum development were explored from a historical viewpoint. Correlation of market place demands in formulation of curricula were re-examined to verify their consideration in research assumptions.

The subsequent chapters utilized the information from the literature reviewed to accomplish the objectives of this study.

III. DESIGN AND IMPLEMENTATION OF THE STUDY

The purpose of this study was to apply current curriculum development practices by analyzing industry and market needs; and to modify an existing Mechanized Agriculture Program and its curriculum to meet the needs of the agricultural, industrial, and landscape businesses in the surrounding community. Resource information presented in Section 2.5, p. 24, was used to formulate the following research design.

1. Selection of the Jury of Experts
2. Preliminary Planning
3. Development of the Survey Objectives
4. Development of the Survey Questionnaire
5. Development of the Cover Letter
6. Selection of the Sample Population
7. Development of the Survey Procedure
8. Survey Findings
9. Data Analysis
10. Program Modification and Curriculum Development
11. Recommendations for Further Study

This Chapter will focus on procedures one through seven. Procedures eight and nine will be discussed in

Chapter IV. Procedure ten is discussed in Chapter V and procedure 11 in chapter VI.

3.1 SELECTION OF THE JURY OF EXPERTS

A jury of experts was selected to include professional representatives to provide input and advice for reviewing and modifying the Mechanized Agriculture Program. According to James Gibson, a 1974 doctoral candidate:

> Persons who are most qualified to judge the competency needs for a particular occupation are those directly engaged in the occupation and those in close professional contact with such persons.[1]

The jury of experts for this study were chosen from the fields of education and industry. The jury included thirteen individuals and their expertise covered a broad base (see Appendix I):

- 4 - Municipal Representatives
  - 1 - Personnel Manager
  - 3 - Equipment Maintenance Supervisors
- 4 - Agricultural or Industrial Sales and Service Representatives
  - 2 - Owners of Equipment Dealerships
  - 1 - Sales Representative of an Equipment Dealership
- 3 - Agricultural Educators
  - 1 - School of Agriculture Associate Dean
  - 1 - Agricultural Engineering Department Chairperson
  - 1 - Agricultural Engineering Professor

---

[1]James Loren Gibson, Occupational Competencies Needed By Persons Entering Selected Farming Occupation, (Ph.D. dissertation, Michigan State University, 1974), p. 41.

2 - Equipment Manufacturers
    1 - National Training Manager
    1 - Southwest Equipment Manufacturer Representative

3.2 PRELIMINARY PLANNING

A brainstorming session was conducted with the jury of experts. Many of the ideas resulting from this session were incorporated in program modification. Following is a summary list of the proposed ideas:

1. A survey should be conducted of local power and machinery related industries.
2. The Mechanized Agriculture Program should continue to keep a broad comprehensive approach.
3. A liason with industry should be established for students to utilize their work experience.
4. An evening program is needed for training technicians and mechanics who have day jobs.
5. Students need to learn trouble-shooting.
6. Development of open-entry, open-exit curriculum should be examined.
7. Industry needs to be involved in program support.
8. Workshops and seminars are needed for skill enhancement training.
9. Both an A.S. degree and certification programs should be offered.
10. The potential of offering a customized training program for interested companies should be investigated.
11. The advisory committee should be expanded to include non-traditional agriculture related industries.
12. The power and machinery skills needed by employees should be identified.

13. Equipment Technology was suggested as a program title to interest agriculture and related industries.

Next, a preliminary planning session was conducted with the jury of experts to establish a direction for updating and modifying the Mechanized Agriculture Program. Traver's five steps for development of a research plan, as listed in Section 2.5, pp. 24-25, were used at the session as a guide for the development of the following:

1. **The Purpose**
   (The Problem)

   The purpose of this study was to apply current curriculum development practices by analyzing industry and market needs; and to modify an existing Mechanized Agriculture Program and its curriculum to meet the needs of the agricultural, industrial, and landscape businesses in the surrounding community.

2. **The Method To Be Used In Achieving The Purpose**
   (The Method To Be Used In Solving The Problem)

   From the four major approaches to obtaining data listed in Section 2.5, p. 26, it was decided that the survey approach would be the best method to achieve the purpose and objectives of this study.

3. **Procedures and Techniques**

   It was decided that a mail survey with clearly defined objectives should be designed, implemented, and analyzed. Utilizing the findings, appropriate revisions would be made in the program and

curricula to conform with the demands of the market and surrounding community.

4. **The Population to be Studied**

It was the opinion of the jury of experts that the school service area radius of ten miles should be increased to twenty miles of the Mt. San Antonio College campus for the following reasons:

A. It incorporated a broader representative sample of the employment market.

B. Twenty miles was an accessible commuting distance.

C. No other community college within this 20-mile radius offered programs or courses in this subject area.

The jury of experts selected six catagories as the major business types to be surveyed. This selection was based on observations that employees in these businesses utilized mechanical and operational skills similar to those utilized by employees in mechanized agriculture businesses.

1. Equipment Dealer
2. Municipality
3. Golf Course
4. School Maintenance
5. Contractor (Building, Excavation, and Landscape)
6. Utility Company

It was further recommended by the jury of experts that references in telephone directories within the

survey area would be utilized to compile the sample population.

5. **Methods to be Used in Processing Data**

It was decided that the qualitative and quantitative measurement methods would be utilized. The jury of experts also recommended that a consultant be contacted for advisement on statistical procedures.

3.3 DEVELOPMENT OF THE SURVEY OBJECTIVES

The REVIEW OF LITERATURE discussed the importance of listing specific survey objectives at the onset of a study. This is done, according to Borg and Gall,[2] to enable the researcher to make sound decisions regarding sample selection, questionnaire construction, and data analysis. The complete list of survey objectives for this study is in Section 1.3, p.13, under Objective 2. The survey objectives were selected in accordance with the purpose statement (study Objectives 1, 2, and 3 listed in section 1.3, pp. 13-14) and the preliminary planning session with the jury of experts.

---

[2]Borg and Gall, Educational Research An Introduction, p. 196.

3.4 DEVELOPMENT OF THE SURVEY QUESTIONNAIRE

A questionnaire entitled "Equipment Technician Survey" (see Appendix J) was developed to specifically address each of the eleven established survey objectives. The questions were designed to provide for a quantitative analysis of industry and market needs within the pre-defined 20-mile radius of Mt. San Antonio College. The first section of the questionnaire simply provided a means to identify the respondent organization, including a contact person for possible follow up. This section was followed by a question targeted at Objective 2A, as outlined in Section 1.3, p. 13, that is, to establish the business type of the organization. The remainder of the questionnaire consisted of ten questions to gather responses in support of the remaining objectives of this survey.

The construction of the questionnaire followed the guidelines listed in Chapter II by Paul Erdos. Four of those questions included an "other" choice with space for an explanation provided. This was done to accommodate unexpected responses. A listing of each survey question, its association to the survey objectives listed in Section 1.3, pp. 13-14, and a brief rationale for its selection follows. A detailed discussion of the survey results is found in Chapter IV.

SURVEY INFORMATIONAL DATA:

This informational data was used to gain basic background information about the business, to establish a contact for follow up, and to set up a record of each respondent to this survey.

COMPANY_____
OWNER_____
STREET ADDRESS_____
CITY_____CA ZIPCODE_____
CONTACT PERSON_____ PHONE ( )_____

The following introductory question was provided in order to satisfy survey Objective 2A; to identify the business type surveyed.

BUSINESS TYPE:
[] DEALER
[] GOLF COURSE
[] CONTRACTOR
[] MUNICIPALITY
[] SCHOOL MAINTENANCE
[] UTILITY COMPANY
[] OTHER (Please specify)_____

SURVEY QUESTION #1: Of the sub-fields listed below, which are closely related to your company?

[] Landscape Irrigation and Drainage
[] Equipment Dealer
[] Residential Landscape Maintenance
[] Equipment Rental
[] Commercial Landscape Maintenance
[] Equipment Repair
[] Landscape Contractor
[] Park Maintenance
[] Building Contractor
[] Excavation Contractor
[] Other (please specify)_____

Survey question #1 was intended to identify the subfields of the business types surveyed in satisfaction of survey Objective 2B. Each respondent was asked to indicate which of the provided subfields best characterized their business. An "other" selection was provided to allow for

unanticipated responses. The selection of these categories was based upon the utilization of similar mechanical and operational skills to that of mechanized agriculture and on the recommendation of the jury of experts. Emphasis was placed on the agricultural, industrial, and landscape businesses utilizing the operation, repair, and maintenance of equipment. For further clarification, the jury of experts verified the selection of these subfields to better define the actual emphasis and focus of each business. Analysis of the data gathered from this question aided the development of curriculum by defining specific job areas (need) within the areas surveyed.

SURVEY QUESTION #2: Do you employ: (If so, How many full time/part-time?)

[] Heavy Equipment Operators _____
[] Medium Equipment Operators_____
[] Small Equipment Operators _____
(Landscape type equipment)
[] Heavy Equipment Mechanics _____
[] Medium Equipment Mechanics_____
[] Small Equipment Mechanics _____
[] Equipment Maintenance/Service_____

This question was asked in order to satisfy survey Objective 2C; to determine the type of equipment technicians employed (need) in the area surveyed. Classification of employees were indicated by job title. Each classification was related to the operation, repair, or maintenance of equipment. The intent of this question was to find out which classification, if any, was predominate in the survey area and to obtain the number of full time and part time employees (need) in each classification. This information

could assist in program and curriculum development, along with identifying facilities and equipment requirements for the modified program.

SURVEY QUESTION #3: Would your company hire an equipment technician with:

[] A. A high school diploma
[] B. A certificate in equipment related field
[] C. A 2 year degree in equipment related field
[] D. A 4 year degree in equipment related field

SURVEY QUESTION #4: In which of the categories in question 3 do you find the most productive employee for your needs?

[]A []B []C []D

Please explain_____

Both questions three and four above were intended to determine the desired educational levels of equipment technicians and which levels demonstrate more productive employees, in satisfaction of survey Objective 2D. Note that both questions are related in content. The intent of question #3 was to establish the desired educational level of an equipment technician. Question #4 was asked to determine a productivity level of the employee. The data obtained from these two questions would assist in the program revision process by indicating any educational level focuses.

SURVEY QUESTION #5: If you were to hire an equipment technician in 1987 what would be a typical starting salary?

[] Below $12,000
[] $12,000 - $16,000
[] $16,000 - $20,000
[] $20,000 - $24,000
[] Above $24,000

Question #5 was asked to determine an average starting salary of an equipment technician, in satisfaction of survey Objective 2E. The responses to this question could establish a typical starting salary range an equipment technology student seeking employment in this area might receive. Potential equipment technicians can then compare this data with other vocational fields. This information is also useful in promoting a profession.

SURVEY QUESTION #6: Would your company be interested in a training program for your current employees at Mt. San Antonio Community College?

[]Y []N

This question was asked in satisfaction of survey Objective 2F. The data received from this question might indicate whether or not the companies surveyed would be interested in an equipment technician training program (need) at Mt. San Antonio College for their employees. However, some companies may prefer to send their employees to specialized workshops and seminars.

SURVEY QUESTION #7: To upgrade your current employees, would you prefer the program to be:

[] Day classes
[] Late afternoon classes

[] Night classes
[] Saturday classes
[] Degree (i.e., A.S.)
[] Certificate
[] Short Term (3-9 wks)
[] Full Term (18 wks)
[] Other (please specify)_____

This survey question was aimed at satisfying survey Objectives 2G and 2H. Survey Objective 2G was to determine the preferred time of day and duration of term for classes to be offered to meet the work schedules of existing employees. Objective 2H was to determine whether the employer would prefer a degree or certificate program (need). Equipment technician courses are typically offered Monday through Friday during normal working hours. This inquiry was made to more clearly identify the needs of the employer. This question was also asked to determine if the employer wanted the employee to obtain a two-year associate degree or a certificate in the Equipment Technology Program. The responses to this question assisted in program revision and curriculum development by determining the time of day and length of term best suited to the employer's schedule. It also established existing preferences between certification or degree, and short term or full term courses.

SURVEY QUESTION #8: What specific technical skills should an equipment technician have for your industry? Check as many as applicable.

[] Large tractor equipment operation
[] Medium tractor equipment operation
[] Light tractor equipment operation
[] Equipment electrical systems
[] Equipment drive trains

[] Equipment maintenance
[] Equipment trouble shooter
[] Irrigation repair/installation
[] Irrigation design
[] On-site work experience
[] Mowing operation
[] Lawn edging operation
[] Chain saw operation
[] Weed eater operations
[] Spraying equipment operation
[] Tillage operation
[] Safety
[] Power tools
[] Basic wood working
[] Basic metalwork
[] Tool maintenance
[] Basic concrete
[] Basic plumbing
[] Basic surveying
[] Welding
[] Diesel engine
[] Gasoline engine
[] Small engine
[] Hydraulics
[] Pneumatics
[] Forklift operation
[] Backhoe operation
[] Skiploader/Scraper
[] Bulldozer
[] Hand tools
[] Other (please specify)_____

Question #8 was designed to satisfy survey Objective 2I and study Objective 3; that is, to identify specific technical skills needed for an equipment technician, and to identify the power and machinery competency needs within the urban community. The skills listed above were derived from the categories of equipment operation, equipment repair and basic mechanical skills. These listed skills also were approved by the jury of experts. The data from this question aided in the development of curriculum to satisfy competency needs and in the establishment of the technical

skills needed for an equipment technician in the area surveyed.

SURVEY QUESTION #9: Would your company support an Equipment Technician Program through:

[] Equipment Donation
[] Equipment Loan
[] Promotion or Pay Raise for Graduates
[] Financial Assistance/Scholarship
[] Facilitating Work Experience
[] Other (please specify)_____

Survey question #9 established whether or not the industry was willing to support an Equipment Technician Program with an equipment donation or loan, compensation to current employees upon completion, scholarships, material support, and/or facilitating work experience, in support of survey Objective 2J. To properly teach principles and application of a subject area, current state of the art equipment is desired. However, this equipment is typically expensive and difficult for an educational program to keep current. Therefore, response selections to question #9 were provided to indicate if the respondent's company would be willing to donate or loan equipment that benefits the program (design). A response was also provided to establish if the company would grant graduates of this program a promotion or pay raise for their efforts in completion of the program. Many businesses encourage their employees to better themselves through education. As a result, a response was also provided to find out if the employer has an incentive program whereby financial or scholarship assistance is provided for their employees. Finally, a

response was provided to determine whether the employer would facilitate work experience (design). The cost of training employees is significant due to the additional time required by the supervisor to oversee the work of the targeted employees. Therefore, it is to the benefit of the employers that they hire people with experience.

SURVEY QUESTION #10: Would you or a representative from your company be willing to serve as a member on an Equipment Technician Advisory Committee at Mt. San Antonio Community College?

[]Y []N

This final survey question was intended to satisfy survey Objective 2K. Involvement of industry representatives is essential to the development and success of a formal technical program (need and design). The 1982 United States Code, Title 20-Education, requires: "Agencies that receive federal vocational education funds establish local councils to be composed of members of the general public, especially of representatives of business, industry, and labor; to provide advice on current job needs and on the relevancy to courses being offered."[3] Also, advisory committees can be utilized as a jury of experts to control as many confounding variables in research as possible.

---

[3]U.S., Congress, House, Law Revision Council, United States Code 1982 Edition, Vol 8, 1983 p. 522.

3.5 DEVELOPMENT OF THE COVER LETTER

The cover letter (see Appendix K) was constructed as recommended by Erdos in Section 2.5, p. 31, to be brief, but to attract the attention of the recipient and induce them to become a survey respondent. As stressed in the literature reviewed, the letter had the appearance in format of a communication asking a favor. The importance of the research project and its purpose was highlighted. The letter was designed to acknowledge the significance of the recipient and the college assisting one another. A note of urgency was also indicated. The appreciation of the author was expressed and a self addressed stamped envelope was included with the survey form.

3.6 SELECTION OF THE SAMPLE POPULATION

A crucial issue in the design of the mail survey is the sample size. "The sample should be large enough to permit estimates sufficiently precise to serve the research needs", writes Erdos, "while it should be small enough to fit the available budget."[4] The sample population, based upon the recommendations of the jury of experts, was drawn from telephone directories covering the established 20-mile radius of Mt. San Antonio College. The directories were referenced using the business type and subfield categories

---

[4]Erdos, Professional Mail Surveys, p. 33.

listed on the survey in the introductory question and survey question #1. The population for this study was inclusive of all businesses advertising in the available phone directories for the survey area. A total of 355 organizations were selected and were mailed this survey questionnaire (see Appendix L).

3.7 SURVEY PROCEDURES

The qualitative preliminary planning session established recommendations from the jury of experts for the construction of the survey objectives. A quantitative Equipment Technician Survey was then developed (Section 3.4, p. 43) and submitted to the jury of experts for review. A list of appropriate businesses was developed using the established sample selection categories of dealer, municipality, golf course, school maintenance, contractor, and utility company (see Appendix L). The Equipment Technician Survey and cover letter, accompanied by a self addressed return envelope (see Appendices J and K) were mailed on April 20, 1987 to a total of 355 organizations. This sample population was selected from a thorough search of telephone directories within the 20-mile radius of Mt. San Antonio College. It was a sampling of nearly the entire population of businesses within the predefined area.

The survey response closing date for this study was July 3, 1987. Sixty-one responses were received, which

equates to a 17.2 percent response rate. According to Joseph C. Marshall, an acceptable survey response rate for this Southern California area is 20 percent.[5] The lower than expected response rate possibly was caused by the sixty-day time constraint imposed due to the curriculum review deadline of Mt. San Antonio College as mandated by the State of California. This short evaluation period did not allow time for follow up mailings.

3.8 SUMMARY

To produce valid and reliable results, both qualitative and quantitative methods were used in this study. Qualitatively, a jury of experts was selected to make recommendations for the construction of the survey objectives. This was intended to establish a maximum degree of validity for the procedure. This was followed by the development of an Equipment Technician Survey instrument. The responses to this survey would provide a quantitative measure of industry and market needs in this occupational field. The survey with an accompanying cover letter was mailed to a sample population of 355 organizations within a 20-mile radius of Mt. San Antonio College. The survey results are summarized in the next chapter, and are reinforced by tables, figures, and narrative.

---

[5]Consultation with Joseph C. Marshall, Director of Research and Information Management, California State Polytechnic University, Pomona, CA, 19 May 1989.

IV. SURVEY FINDINGS AND ANALYSIS

Information obtained from the surveys was coded and processed using a mainframe computer. A statistical software package designed for social sciences was used to generate the frequency distribution breakdowns.

Consultations were held with personnel from the Office of Computer Services, Mt. San Antonio College; the Department of Agricultural Education, California State Polytechnic University, Pomona; and the Office of Research and Information Management, California State Polytechnic University, Pomona regarding appropriate statistical procedures. They recommended that, in most cases, the appropriate statistical test for analyzing the responses to this survey would be the single sample Chi-squared statistic. Chi-square is a numerical measure of the difference between the values actually observed and those expected. The expected value for this study was one-half the total response (30.5). This value was assumed because no pilot studies or pre-tests were performed to indicate a statistical reference. This decision was based upon the guidelines set forth by statistician and author Herbert

Friedman.[1] In addition, a statistical correction for continuity adjustment was made for tests where the degrees of freedom of the sample equaled one. This corrected continuity was an adjustment to the Chi-square by subtracting one-half from each observed value as well as subtracting the expected value from each observed value. This correction to the calculations was also suggested by Herbert Friedman.[2]

This chapter begins with Tables 2 through 12, which are summaries of the responses to each survey question in frequency distributions with Chi-squared statistics as appropriate. The next section of this chapter contains analysis of the data and descriptive statistics. A summary section concludes this chapter.

4.1 SURVEY RECAPITULATION

The following are recapitulation tables summarizing the survey findings by frequency (number of responses), percentage, and Chi-squared statistics, as appropriate. Table 2 corresponds to the initial survey question regarding the type of business surveyed. Tables 3 through 12 correspond to survey questions 1 through 10, respectively. Chi-squared statistics are calculated for the responses contained in Tables 3 through 8 and Tables 10 through 12.

---

[1]Herbert Friedman, Introduction to Statistics, (New York: Random House Inc., 1972), pp. 15-23.

[2]Ibid., p. 21.

Table 2 -- Frequency Distribution Of Business Types Surveyed

BUSINESS TYPES SURVEYED	f	%
DEALER	11	18.0
GOLF COURSE	0	0.0
CONTRACTOR	11	18.0
MUNICIPALITY	14	23.0
SCHOOL MAINTENANCE	5	8.2
UTILITY COMPANY	4	6.6
OTHER (Please specify)	16	26.2
TOTALS	61	100.0

(f -- frequency % -- percentage)

Table 3 -- Frequency Distribution And Chi-Squared Values For Subfields Of The Business Types Surveyed

QUESTION #1 SUBFIELDS OF THE BUSINESS TYPES	f	%	X^2 (df=1)
Landscape Irrigation and Drainage	31	50.8	0.00
Residential Landscape Maintenance	13	21.3	21.24 ***
Commercial Landscape Maintenance	23	37.7	4.20 *
Landscape Contractor	16	26.2	13.07 ***
Building Contractor	10	16.4	26.67 ***
Equipment Dealer	18	29.5	9.60 **
Equipment Rental	19	31.1	8.07 **
Equipment Repair	37	60.7	3.27
Park Maintenance	22	36.1	4.27 *
Excavation Contractor	11	18.0	24.07 ***
Other	9	14.8	29.40 ***
No Response	1	1.6	

*** p < .001
** p < .01
* p < .05

(f -- frequency % -- percentage X^2 -- chi-squared
df -- degrees of freedom p -- probability)

Table 4 -- Frequency Distribution And Chi-Squared Values For Equipment Technician Employee Types

QUESTION #2 EMPLOYEE TYPES	f	%	X^2 (df=1)	
Heavy Equipment Operators	17	27.9	11.27	***
Medium Equipment Operators	16	26.2	13.07	***
Small Equipment Operators	29	47.5	0.07	
Heavy Equipment Mechanics	21	34.4	5.40	*
Medium Equipment Mechanics	30	49.2	0.00	
Small Equipment Mechanics	27	44.3	0.60	
Equipment Maintenance/Service	27	44.3	0.60	
No Response	6	9.8		

*** p < .001
* p < .05

(f -- frequency % -- percentage X^2 -- chi-squared
df -- degrees of freedom p -- probability)

Table 5 -- Frequency Distribution And Chi-Squared Values For The Educational Level Desired By Prospective Employers Of Equipment Technicians

QUESTION #3 EDUCATIONAL LEVEL	f	%	X^2 (df=1)	
High School Diploma	37	60.7	3.27	
Certificate	48	78.7	21.60	***
2 Year Degree	27	44.3	0.60	
4 Year Degree	16	26.2	13.07	***
No Response	5	8.2		

*** p < .001

(f -- frequency % -- percentage X^2 -- chi-squared
df -- degrees of freedom p -- probability)

Table 6 -- Frequency Distribution And Chi-Squared Values For The Educational Level Found Most Productive By Prospective Employers Of Equipment Technicians

QUESTION #4 MOST PRODUCTIVE EDUCATIONAL LEVEL	f	%	X^2 (df=1)
High School Diploma	12	19.7	21.60 ***
Certificate	33	54.1	0.60
2 Year Degree	12	19.7	21.60 ***
4 Year Degree	5	8.2	41.67 ***
No Response	14	23.0	

*** p < .001

(f -- frequency % -- percentage X^2 -- chi-squared
df -- degrees of freedom p -- probability)

Table 7 -- Frequency Distribution And Chi-Squared Value For The Typical Starting Salary Range Of An Equipment Technician For 1987

QUESTION #5 TYPICAL STARTING SALARY	f	%	X^2 (df=4)
Below $12,000	5	8.2	22.69 ***
$12,000 - $16,000	21	34.4	
$16,000 - $20,000	19	31.2	
$20,000 - $24,000	10	16.4	
Above $24,000	3	4.9	
No Response	3	4.9	
TOTALS	61	100.0	

*** p < .001

(f -- frequency % -- percentage X^2 -- chi-squared
df -- degrees of freedom p -- probability)

Table 8 -- Frequency Distribution And Chi-Squared Value For The Potential Use Of Mt. San Antonio College Campus As The Site For Company Employee Training

QUESTION #6 EMPLOYEE TRAINING PROGRAM	f	%	X^2 (df=1)
Yes	29	47.5	0.26
No	32	52.5	
TOTALS	61	100.0	

(f -- frequency % -- percentage X^2 -- chi-squared df -- degrees of freedom p -- probability)

Table 9 -- Frequency Distribution Of The Equipment Technology Program Preferences By Prospective Employers

QUESTION #7 PREFERENCES	f	%
Day Classes	2	3.3
Late Afternoon Classes	8	13.1
Night Classes	34	55.7
Saturday Classes	14	23.0
Degree	3	4.9
Certificate	23	37.7
Short Term	25	41.0
Full Term	4	6.6
Other	0	0.0
No Response	20	32.8

(f -- frequency % -- Percentage)

Table 10 -- Frequency Distribution And Chi-Squared Values For Specific Technical Skills Needed For An Equipment Technician Identified By Prospective Employers

QUESTION #8 SPECIFIC TECHNICAL SKILLS	f	%	X^2 (df=1)	
Large tractor equipment operation	22	36.1	4.27	*
Medium tractor equipment operation	34	55.7	1.07	
Light tractor equipment operation	35	57.4	1.67	
Equipment electrical systems	38	62.3	4.27	*
Equipment drive trains	35	57.4	1.67	
Equipment maintenance	51	83.6	29.40	***
Equipment trouble shooter	42	68.9	9.60	**
Irrigation repair/installation	27	44.3	0.60	
Irrigation design	10	16.4	26.67	***
On-site work experience	29	47.5	0.07	
Mowing operation	25	41.0	1.67	
Lawn edging operation	23	37.7	3.27	
Chain saw operation	27	44.3	0.60	
Weed eater operation	30	49.2	0.00	
Spraying equipment operation	29	47.5	0.07	
Tillage operation	19	31.1	8.07	**
Safety	45	73.8	15.00	***
Power hand tools	39	63.9	5.40	*
Basic woodworking	9	14.8	29.40	***
Basic metalwork	12	19.7	21.60	***
Tool maintenance	33	54.1	0.60	
Basic concrete	18	29.5	9.60	**
Basic plumbing	21	34.4	5.40	*
Basic surveying	7	11.5	35.27	***
Welding	36	59.0	2.40	
Diesel engine repair	29	47.5	0.07	
Gasoline engine repair	40	65.6	6.67	**
Small engine repair	38	62.3	4.27	*
Hydraulics	34	55.7	1.07	
Pneumatics	22	36.1	4.27	*
Forklift operation	22	36.1	4.27	*
Backhoe operation	25	41.0	1.67	
Skiploader/scraper	26	42.6	1.07	
Bulldozer	6	9.8	38.40	***
Hand tools	37	60.7	3.27	
Other	6	9.8	38.40	***
No Response	4	6.6		

*** p < .001
** p < .01
* p < .05
(f -- frequency % -- percentage X^2 -- chi-squared
df -- degrees of freedom p -- probability)

Table 11 -- Frequency Distribution And Chi-Squared Values For Prospective Support For The Equipment Technology Program

QUESTION # 9 PROGRAM SUPPORT	f	%	X^2 (df=1)
Equipment Donation	8	13.1	32.27 ***
Equipment Loan	5	8.2	41.67 ***
Promotion or Pay Raise	10	16.4	26.67 ***
Financial Assistance/Scholarship	4	6.6	45.07 ***
Facilitating Work Experience	14	23.0	17.07 ***
Other	6	9.8	38.40 ***
No Response	27	44.3	

*** p < .001

(f -- frequency % -- percentage X^2 -- chi-squared
df -- degrees of freedom p -- probability)

Table 12 -- Frequency Distribution And Chi-Squared Value For Prospective Membership On The Equipment Technology Advisory Committee

QUESTION #10 ADVISORY COMMITTEE	f	%	X^2 (df=1)
Yes	23	37.7	4.20 *
No	38	62.3	
TOTALS	61	100.0	

* p < .05

(f -- frequency % -- percentage X^2 -- chi-squared
df -- degrees of freedom p -- probability)

4.2 ANALYSIS OF DATA AND DESCRIPTIVE STATISTICS

The following discussions reference the tables contained in Section 4.1, p. 56, and are reinforced with graphs in Figures 1 through 11.

Table 2 shows the frequency distribution of the types of businesses surveyed. Note that a zero response rate was achieved for the Golf Course category. Also note that the "Other" category received sixteen responses. These responses were for Equipment Rental (7), Manufacturer (3), Equipment Repair (3), Cemetery (2), and Developer (1). Figure 1 graphically represents the frequency distribution contained in Table 2. A Chi-square test was not utilyzed in Table 2. The distribution was acceptable by the jury of experts and this data was only used for informational purposes. However, the subfields of the business types question demonstrated in Table 3 was designed to measure the specified interests of the businesses surveyed.

Table 3 shows the frequency distribution and calculated Chi-squared values for the subfields of the business types survey question. The "Other" category contained responses for Water Service and Distribution (4), Manufacturer (2), Pipeline (1), Highway Maintenance (1), and Land Developer (1). Since respondents checked more than one selection, each selection was analyzed with a single sample chi-squared test with a correction for continuity, as suggested by Herbert Friedman when the degrees of freedom of the sample equal 1

(df=1).[3] Significant probability levels are footnoted where applicable. Probability, as defined by Friedman, indicates the level of probability that the observed value did not occur by chance.[4] So, if the probability level is stated as less than .05 ($p < .05$), for example, it means that there is less than a 5 percent probability that the observed value occurred by chance. Or, conversely, there is greater than a 95 percent chance that the observed value did not occur by chance. Note in Table 3 that only the Landscape Irrigation and Drainage response and the Equipment Repair response were not statistically significant. This indicates that these two items were selected at a rate that was not statistically different from expectation. Statistical expectation equals 30.5 for analyses where df=1 in this survey. So, approximately half of the sample selected these options. On the other hand, all other selections were checked at a rate below the expected rate, with varying probability levels. Figure 2 presents a graphical picture of these responses.

---

[3]Ibid.

[4]Ibid., p. 5.

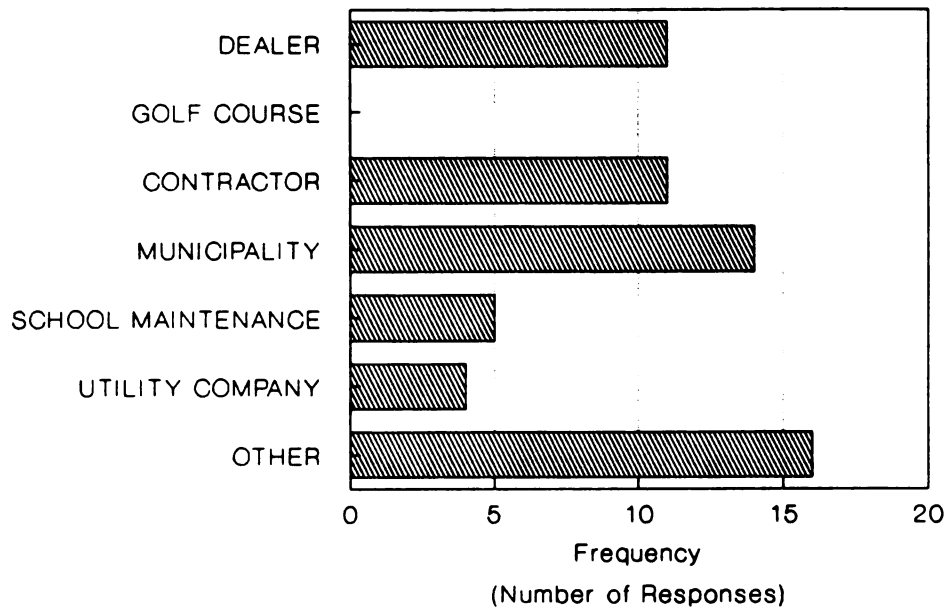


Figure 1 -- Response Rates Of The Business Types Surveyed

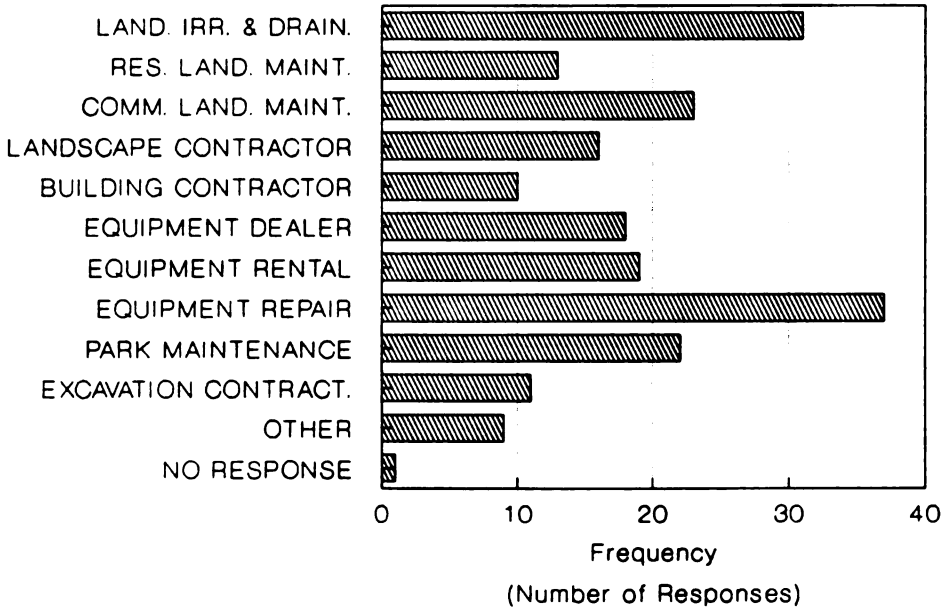


Figure 2 -- Subfields Of The Business Types Surveyed

The rationale and explanation contained in the preceding paragraph will also apply to the remainder of this section, except as noted otherwise.

Table 4 shows the frequency distribution and calculated Chi-squared values for employee types. Note that Heavy Equipment Operators (X^2=11.27, df=1, $p < .001$), Medium Equipment Operators (X^2=13.07, df=1, $p > .001$), and Heavy Equipment Mechanics (X^2=5.40, df=1, $p < .05$) were selected by respondents at a rate significantly less than expected. All other options were checked at a level not significantly different from expectation. Figure 3 graphically represents this data.

Table 5 shows the frequency distribution and Chi-squared values for the educational level that a company would seek in hiring an equipment technician. Note that Certificate was by far the preferred level of education for this group of respondents (X^2=21.60, df=1, $p < .001$). On the other hand, a 4 Year Degree is the least preferred educational level (X^2=13.07, df=1, $p < .001$). The responses for High School Diploma and 2 year Associate Degree were not significantly different from expectation. Figure 4 shows a graph of these response rates.

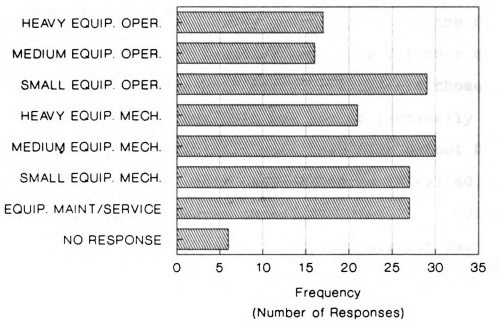


Figure 3 -- Equipment Technician Employee Types

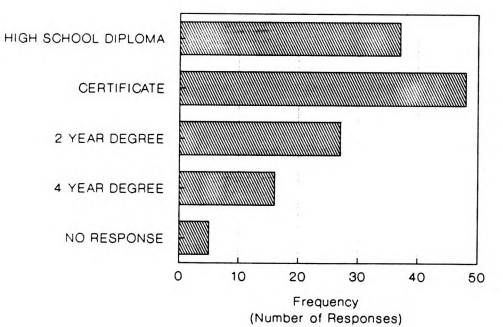


Figure 4 -- Educational Level Desired By Prospective Employers Of Equipment Technicians

Table 6 shows the frequency distribution and Chi-squared values for the survey question seeking the most productive educational level of employees for this group. Slightly more than one-half of the respondents chose the certificate program, but this was not statistically different from expectation. Note that High School Diploma (X^2=21.60, df=1, $p < .001$), 2 Year Degree (X^2=21.60, df=1, $p < .001$), and 4 Year Degree (X^2=41.67, df=1, $p < .001$) were selected significantly fewer times than statistical expectation. This is consistent with the summarization in the preceding paragraph, regarding desired educational level. Figure 5 depicts this data graphically.

Table 7 shows the frequency distribution and calculated Chi-squared value for responses to the typical starting salary question. In this case, only one response per category was provided. Therefore, the degrees of freedom for this test equaled 4 (df = the number of categories minus one) resulting in only one Chi-square value. A correction for continuity was not employed in this case, since the degrees of freedom were greater than one. Note that the statistical test proved to be significant (X^2=22.69, df=4, $p < .001$). By examining the data, it is clear that the most typical starting salary for this group is in the $12,000 to $20,000 range. Figure 6 more clearly depicts this response rate.

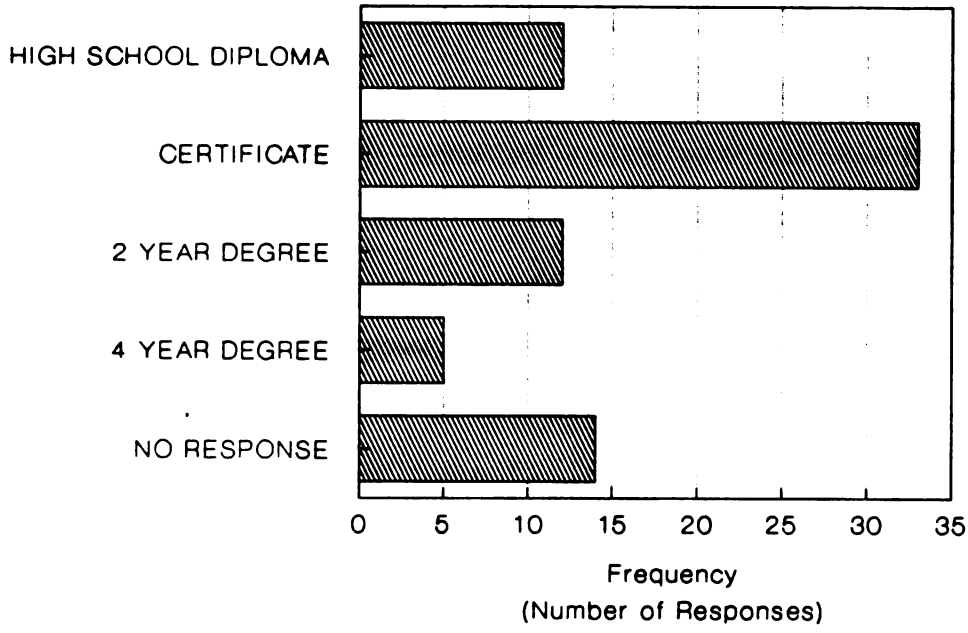


Figure 5 -- Educational Level Found Most Productive By Prospective Employers Of Equipment Technicians

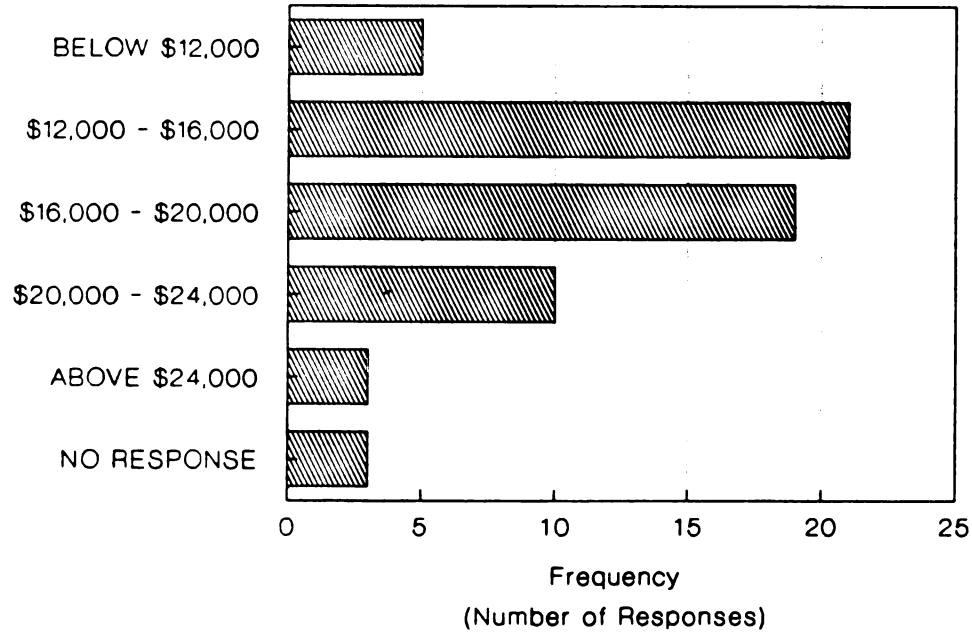


Figure 6 -- Typical Starting Salary Range For An Equipment Technician In 1987

Table 8 shows the responses to the question regarding whether or not respondents would be interested in an employee training program at Mt. San Antonio College. Note that the calculated Chi-squared value was not significant. A 95 percent confidence interval was computed to project an estimate of the population's probability of desiring an employee training program. There is at least 95 percent confidence that at least 36 percent of the population would be interested in an employee training program. Figure 7 provides a graph of this data.

Table 9 shows the frequency distribution regarding employer preferences. Due to the nature of this question, a statistical test was not performed on the data. If the question had been structured into three seperate questions requesting information on potential: (1) class scheduling, (2) degree or certificate preference, and (3) class duration, Chi-square testing would have been appropriate. However, based upon the response rates, certain preferences are apparent. For example, a clear preference is noted for Night Classes. A preference is also shown for Certificate programs of Short Term duration. Figure 8 shows these responses more clearly.

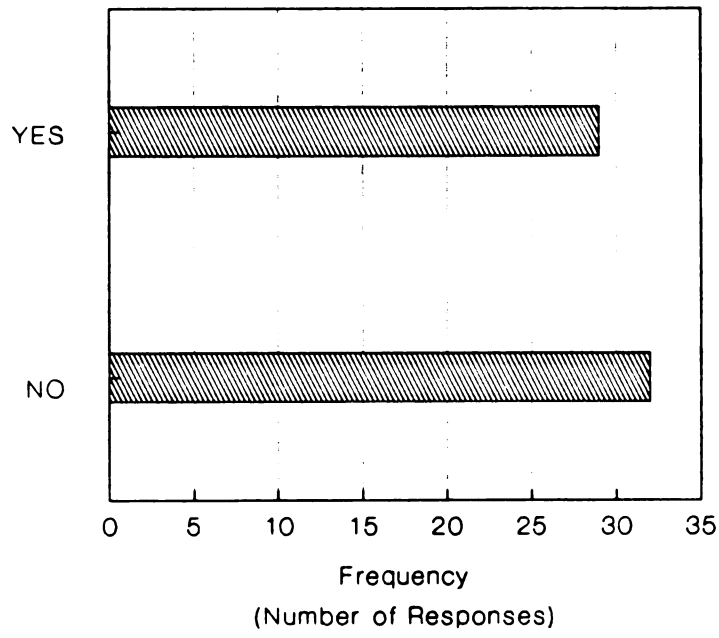


Figure 7 -- Potential Use Of Mt. San Antonio College Campus As The Site For Company Employee Training

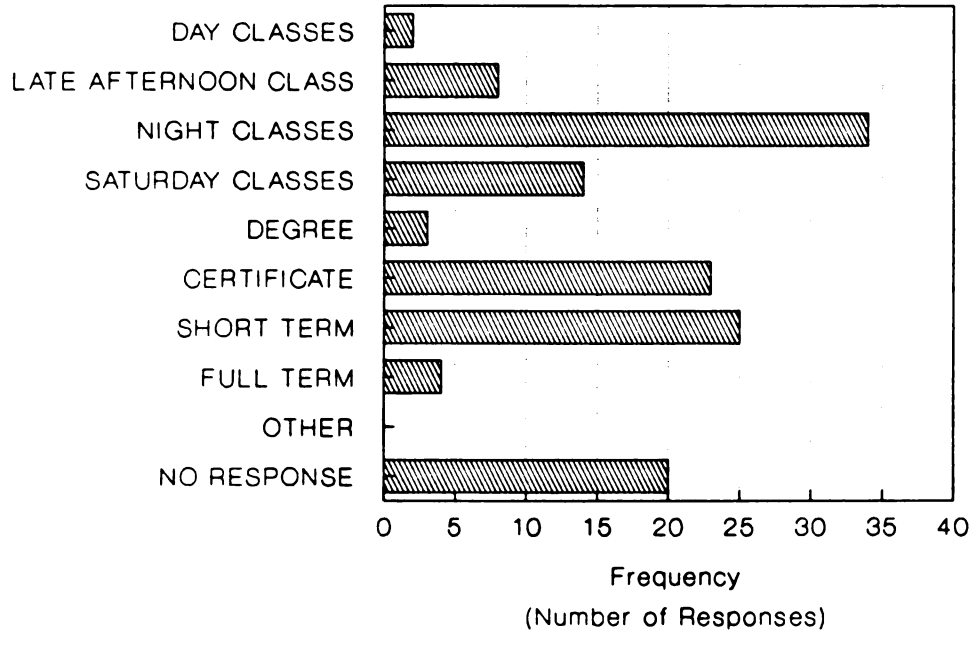


Figure 8 -- Equipment Technology Program Preferences By Prospective Employers

Table 10 provides the frequency distribution and Chi-squared values for responses to the survey question regarding specific technical skills. Note that several responses were selected at a statistically significant level. These significant selections may be seperated into two categories: (1) those selected significantly less than expectation, and (2) those selected significantly greater than expectation. Those selected at a level less than expectation are Large Tractor Equipment Operation (X^2=4.27, df=1, $p < .05$), Irrigation Design (X^2=26.67, df=1, $p < .001$), Tillage Operation (X^2=8.07, df=1, $p < .01$), Basic Woodworking (X^2=29.40, df=1, $p < .001$), Basic Metalwork (X^2=21.60, df=1, $p < .001$), Basic Concrete (X^2=9.60, df=1, $p < .01$), Basic Plumbing (X^2=5.40, df=1, $p < .05$), Basic Surveying (X^2=35.27, df=1, $p < .001$), Pneumatics (X^2=4.27, df=1, $p < .05$), Forklift Operation (X^2=4.27, df=1, $p < .05$), Bulldozer (X^2=38.40, df=1, $p < .001$), and the "Other" response (X^2=38.40, df=1, $p < .001$). Those selected at a level greater than expectation are Equipment Maintenance (X^2=29.40, df=1, $p < .001$), Equipment Trouble Shooter (X^2=9.60, df=1, $p < .01$), Safety (X^2=15.00, df=1, $p < .001$), Power Hand Tools (X^2=5.40, df=1, $p < .05$), Gasoline Engine Repair (X^2=6.67, df=1, $p < .01$), and Small Engine Repair (X^2=4.27, df=1, $p < .05$). Figure 9 presents a graphical view of these responses.

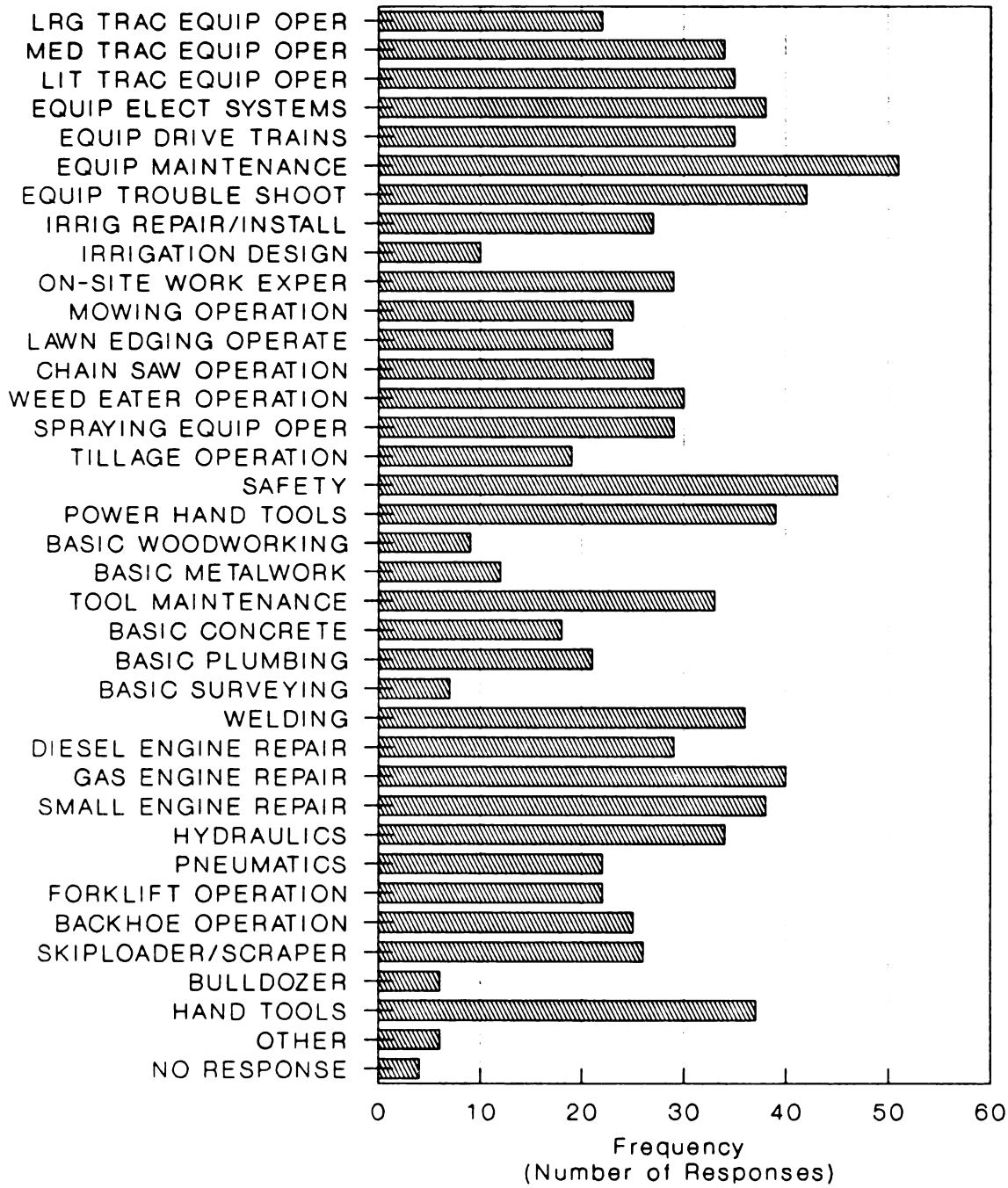


Figure 9 -- Specific Technical Skills Needed For An Equipment Technician Identified By Prospective Employers

Table 11 shows the frequency distribution and Chi-squared values for the question regarding employer program support. Note that all responses were checked at a significantly lower rate than expectation. Furthermore, all values were significant at the .001 level of probability. In addition, fully 44 percent of this group did not respond to the question. Figure 10 provides a graphical representation of this data. Organizations answering with a positive response were placed on a list indicating the type(s) of support they were potentially willing to pledge. (see Appendix M)

Table 12 shows the frequency distribution and calculated Chi-squared value for the question regarding whether or not respondents would be willing to serve on an advisory committee. Note that while 23 employers did indicate a willingness on their part, this was at a rate which was statistically significantly less than expectation ($X^2=4.20$, df=1, $p < .05$). Figure 11 graphically shows this response rate breakdown. Organizations answering with a positive response were placed on a list for an advisory committee. (see Appendix N)

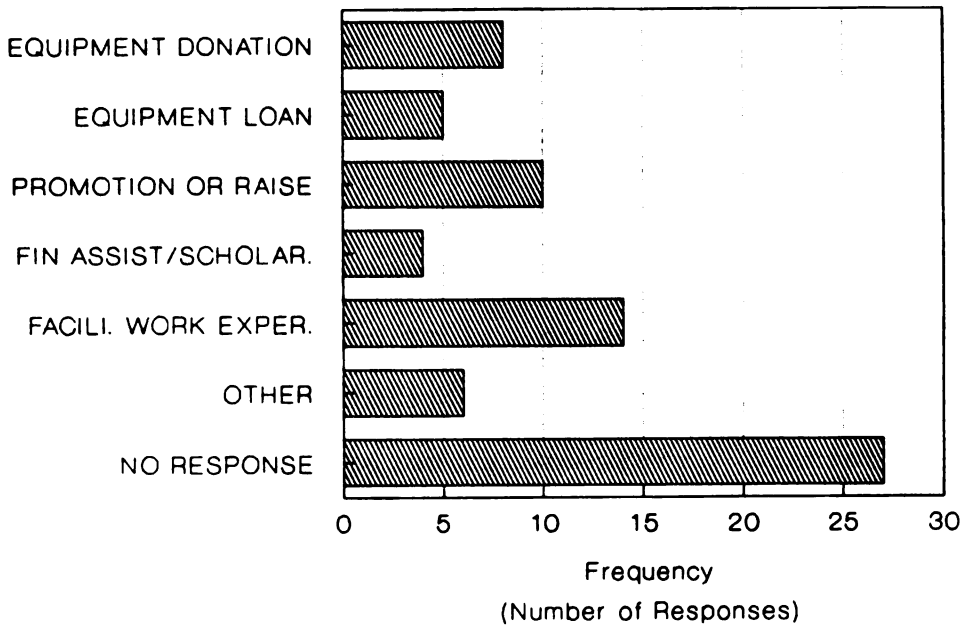


Figure 10 -- Prospective Industry Support For The Equipment Technology Program

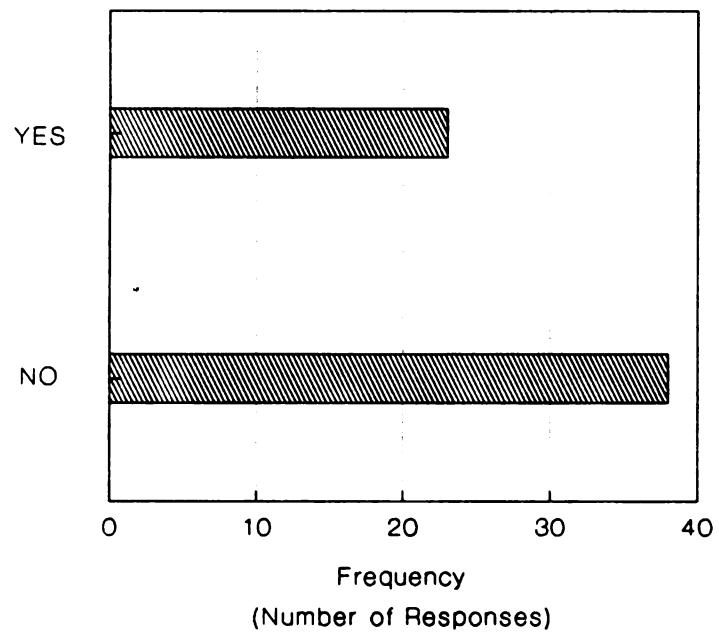


Figure 11 -- Prospective Membership For The Equipment Technology Advisory Committee

4.3 SUMMARY

Responses to all survey questions were examined in terms of frequency and percentage of the sample distribution. Additionally, Chi-squared statistics were calculated on the responses to the survey questions as appropriate, according to the guidelines set forth by Herbert Friedman. Statistical corrections to the calculations were applied as necessary. Statistical significance, in terms of this document, refers to results obtained at probability levels of less than .05. Using this definition, a number of statistically significant results were obtained by the Chi-squared analyses. Significant responses occurred at both below and above the expected rates. All significant probability levels ranged from less than .05 to less than .001. Further amplification of these results are contained in subsequent chapters and sections.

V. DESIGN FOR PROGRAM REVISION AND CURRICULUM DEVELOPMENT

To satisfy Objective 4 (Section 1.3, p. 14) of this study, a meeting was conducted with the jury of experts for assessing the existing Mechanized Agriculture Program and its ability to satisfy the competency needs of the urban employment market within the previously defined survey area. As stated earlier in Section 1.2, p. 3, the jury of experts concluded that modification of the existing program was the only feasible method of applying the study results. They also agreed that the program be given the new title of Equipment Technology. The new name was intended to enhance the interest of other industries related to agriculture which utilize similar mechanical and operational skills.

The conclusion to alter the existing Mechanized Agriculture Program and rename it to the Equipment Technology Program was based upon the following facts.

1. Projections show that the percentage of urban land and the population would continue to increase in the Mt. San Antonio College district and adjacent subregions (see Table I, Section 1.2, p. 10).

2. Reviews of the fundamental goals established for vocational education by the California Community

Colleges Board of Governors and of the Mission Statement of Mt. San Antonio College indicated that the existing Mechanized Agriculture Program was inadequately serving the changing local urban employment market.

3. No competitive Southern California community college program in Mechanized Agriculture or equipment related fields existed within the 20-mile radius of the Mt. San Antonio campus (see Appendix H).

4. Analysis of the survey, satisfying Objective 2, (Section 1.3 pp. 13-14) confirmed the decision to proceed with program modification and curriculum development (See Tables 2-12, pp. 57-62 and Figures 1-11, pp. 65-75).

5. As stated in Section 1.2, p. 9, the predominate agriculture based industry in the San Gabriel Valley, the college service area, was related to landscaping and nursery management. Survey substantiation of this can be seen in Table 3, p. 57 and Figure 2, p. 65, where it is shown that Landscaping and Equipment Repair were identified as the leading business subfields.

The remainder of this chapter concentrates on Objectives 5 and 6, and is divided into five sections:

program revision, justification for the required courses, curriculum development, content of the required courses, and summary. In review, Objective 5 was to design and develop modifications to the existing Mt. San Antonio College Mechanized Agricultural Program to conform with urban employment and market demands as demonstrated by research and survey findings. And, Objective 6 was to develop and/or revise curriculum that corresponds with program modifications.

5.1 PROGRAM REVISION

Community College programs of study must follow specific state, college, and departmental requirements. To earn an A.S. degree at Mt. San Antonio College during the 1980s, a minimum of sixty units had to be completed from a combination of general education, core, and required courses. Twenty-four units of general education courses were required. Appendix O contains a complete listing of the general education requirements. A certificate was earned by the completion of a set of appropriate required courses, but the general education and core courses were not required for a certificate program.

The rationale for the general education requirement at Mt. San Antonio is stated in its 1987-1988 catalog, which reads:

The general education requirements as mandated by the

> state of California and incorporated into the curriculum at Mt. San Antonio College insures that the graduate has a broad general knowledge of the physical world and its inhabitants, an understanding of the achievements of humankind, and the ability to think and communicate in a clear and logical manner.[1]

The core course requirements of the Mt. San Antonio College, Agricultural Sciences Department are for all Agriculture A.S. degree programs. The minimum of eleven and one-half units of core coursework offered students a foundation in opportunities in the field of Agriculture and Agri-business concepts. Appendix P contains a core course listing and curriculum.

A minimum of twenty units of required courses complete the specifications for earning an A.S. degree at Mt. San Antonio College. This would certify that the student had acquired a level of competency in a specific course of study. Certificate programs required between twenty-four and thirty units of specific coursework. Certificate programs must be administrated under an A.S. degree program.

The Mechanized Agriculture Program at Mt. San Antonio College in 1987 consisted of an Associate in Science Degree in Mechanized Agriculture and two certification options: (1) Power and Machinery; and, (2) Horticultural Equipment Technician (see Appendix F). As specified earlier in this chapter, the jury of experts agreed upon program modification and a program name change. As a result, the newly revised program would be named The Equipment

---

[1]Mt. San Antonio College Catalog, 1987, p. 14.

Technology Program. In concordance with the survey results summarized in Table 3, p. 57 and Figure 2, p. 65, the Equipment Technology Program was designed to offer an Associate in Science Degree in Equipment Technology and two certificate options: (1) Equipment Technology; and, (2) Landscape Equipment Technology. The Equipment Technology Certificate was designed to meet the technician training needs of the agricultural and industrial businesses, as they were indicated in the survey and shown in Table 10 and Figure 9. The second certificate option, Landscape Equipment Technology, was developed beacause the predominate agriculture based industry in the college service area was related to landscaping and nursery management (Section 1.2, p. 9). This curriculum varies from the Equipment Technology Certificate in that it does not require the large engine or power train repair courses. However, this certificate requires two additional units of work experience and the Horticultural Science course. This allowed for an emphasis in small equipment operation, maintenance and repair, along with horticultural science concerns. The program was also developed in such a way that any student who had completed the required coursework for one of the two certificate options would only have to complete the core and general education course requirements if they decided to change to an A.S. degree program.

Tables 13, 14, and 15 show program descriptions for the A.S. Degree in Equipment Technology, the Equipment

Technology Certificate, and the Landscape Equipment Technology Certificate, respectively. Course revisions and additions, relative to the previous program of study, are footnoted as appropriate. These tables are followed by justification for the required courses including rationale as to how they relate to the results of the survey.

Table 13 -- Associate In Science Degree For Equipment Technology

DESCRIPTION:

This program is intended to prepare students for entry level employment and advancement. Students will obtain a balance of technical knowledge, theory, and principles along with basic skill development. Students planning to obtain an Associate in Science Degree in Equipment Technology must complete 24 units of general education, 11.5 units of core coursework, and 26 units of required courses.

		UNITS
GENERAL EDUCATION COURSES: (see Appendix O)		24.0
CORE COURSES: (see Appendix P)		
AGAG 5	Agriculture Industry Orientation	.5
*EQUP 20	Agricultural Mechanics	2.0
AGAB 20A	Intro to Microcomputers for Agriculture	1.0
AGAB 20B	Microcomputer Applications in Agriculture	2.0
AGAB 23	Agricultural Sales and Service	3.0
AGAG 91	Agricultural Calculations	3.0
TOTAL UNITS		11.5
REQUIRED COURSES: (Choose one option)		
I - Equipment Technology Certificate		26.0
II - Landscape Equipment Technology Certificate		25.0

* Revised Course

Table 14 -- Equipment Technology Certificate

DESCRIPTION:

This program of study is designed to prepare students for entry level positions or skill enhancement in the operation, service, maintenance, and repair of industrial and agricultural power and machinery.

		UNITS
REQUIRED COURSES:		
*EQUP 1	Small Equipment Operation	2.0
*EQUP 2	Tractor Operation	2.0
**EQUP 3	Advanced Tractor Operation	2.0
**EQUP 10	Hydraulics	3.0
**EQUP 11	Small Engine Repair	2.0
*EQUP 12	Gasoline Engine Repair	2.0
**EQUP 13	Diesel Engine Repair	2.0
**EQUP 14	Power Train Repair	2.0
**EQUP 15	Equipment Repair - Electrical	1.0
**EQUP 16	Equipment Repair - Trouble Shooting	1.0
*EQUP 22	Surveying Skills	1.0
WELD 50	Welding - Oxyacetylene	2.0
WELD 51	Welding - Arc	2.0
AGAG 13	Seminar in Agricultural Occupations	1.0
AGAG 59	Work Experience	1.0
TOTAL UNITS		26.0

* Revised Course
** New Course

Table 15 -- Landscape Equipment Technology Certificate

DESCRIPTION:

This program of study is designed to prepare students for entry level positions or skill enhancement in the operation, service, maintenance, and repair of landscape equipment.

		UNITS
REQUIRED COURSES:		
AGOR 1	Horticultural Science	3.0
*EQUP 1	Small Equipment Operation	2.0
*EQUP 2	Tractor Operation	2.0
**EQUP 3	Advanced Tractor Operation	2.0
**EQUP 10	Hydraulics	3.0
**EQUP 11	Small Engine Repair	2.0
**EQUP 15	Equipment Repair - Electrical	1.0
**EQUP 16	Equipment Repair - Trouble Shooting	1.0
*EQUP 22	Surveying Skills	1.0
WELD 50	Welding - Oxyacetylene	2.0
WELD 51	Welding - Arc	2.0
AGAG 13	Seminar in Agricultural Occupations	1.0
AGAG 61	Work Experience	3.0
TOTAL UNITS		25.0

*Revised Course
**New Course

5.2 JUSTIFICATION FOR THE REQUIRED COURSES

The required courses for the Equipment Technology Program were designed from both the quantitative survey findings and the qualitative analysis by the jury of experts. Figure 12 graphically demonstrates how these courses relate to the survey technical skill responses. Each skill that was incorporated into one or more courses is identified by a frequency bar depicting the prefix and specific course number(s). The jury reviewed the quantitative responses to survey question #8, then through qualitative analysis they grouped the skills into three catagories: (1) Operations, (2) Repairs, or (3) Basic Skills.

The Operations catagory was incorporated into three courses:

* (EQUP 1) Small Equipment Operation
* (EQUP 2) Tractor Operation
** (EQUP 3) Advanced Tractor Operation

The Repairs catagory was incorporated into nine courses:

** (EQUP 10) Hydraulics
** (EQUP 11) Small Engine Repair
* (EQUP 12) Gasoline Engine Repair
** (EQUP 13) Diesel Engine Repair
** (EQUP 14) Power Train Repair
** (EQUP 15) Equipment Repair - Electrical
** (EQUP 16) Equipment Repair - Trouble Shooting
(WELD 50) Welding - Oxyacetylene
(WELD 51) Welding - ARC

*Revised Course
**New Course

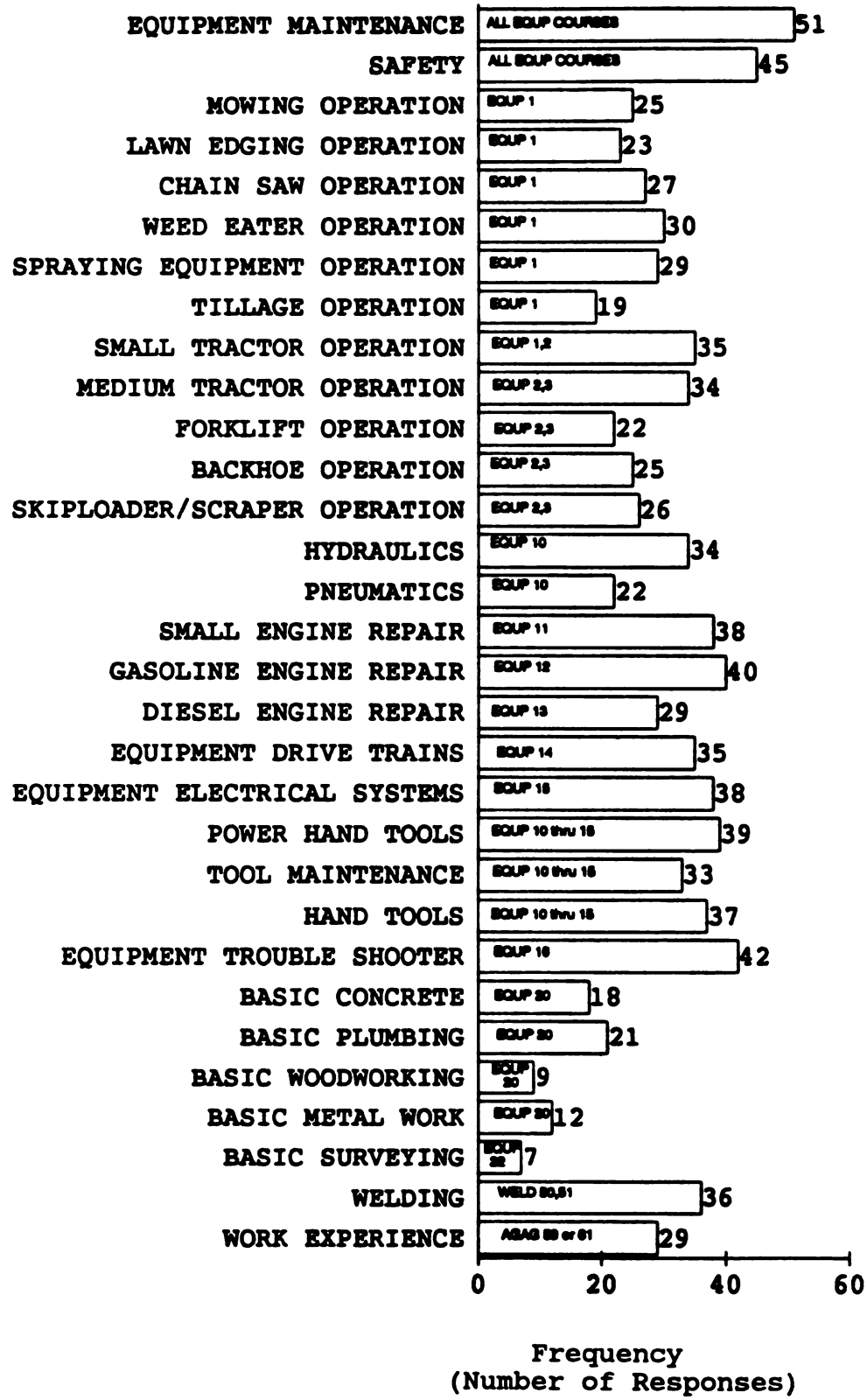


Figure 12 -- Equipment Technology Required Courses Charted As They Relate To The Survey's Specific Technical Skill Responses

The Basic Skills catagory was incorporated into three courses:

*	(EQUP 20)	Agricultural Mechanics (Required only for A.S. Degree as a Core Course.)
*	(EQUP 22)	Surveying Skills
	(AGAG 59 or 61)	Work Experience

Basic skills were also incorporated into the repair course content as they applied to the specific repair area. Equipment Maintenance and Safety skills were included into the design of all the EQUP courses due to the indicated need of greater than expectation.

The following paragraphs refer to each specific required course, and is supplemented with a rationale for its addition or revision, as appropriate.

(*EQUP 1) SMALL EQUIPMENT OPERATION

The agricultural, industrial, and particularly the landscape business utilize a variety of specialized small equipment in their everyday operations. It was therefore decided to modify the existing course content to include several small equipment operations. This modification was suggested by the statistically significant number of responses to the survey question regarding specific technical skills in the area of power hand tools, since this category may refer to a wide variety of small equipment functions.

*Revised Course

(*EQUP 2) TRACTOR OPERATION
(**EQUP 3) ADVANCED TRACTOR OPERATION

Tractors continue to be an essential tool for industry. And, even though the responses to this particular skill were not statistically significant, nearly 60 percent of the survey respondents indicated an interest in this skill. Therefore, the existing Tractor Operation course was enhanced and an Advanced Tractor Operation course was added to the new program. The addition of this new course allowed increased emphasis on operational skill development.

(**EQUP 10) HYDRAULICS

Industry increasingly utilizes mechanical and fluid power to accomplish job tasks. Indeed, hydraulics is an integral part of the operations of both tractors and much small equipment. In addition, nearly 60 percent of the survey respondents indicated a desire for this particular skill, although this was not statistically significant. It was therefore decided that an hydraulics course would be added to the curriculum in order to enhance and more fully round out the skills of the students. Due to a response below expectation, pneumatics was not developed into a specific course. It was incorporated into the hydraulics course content.

*Revised Course
**New Course

(EQUP 11) SMALL ENGINE REPAIR**
(*EQUP 12) GASOLINE ENGINE REPAIR
(EQUP 13) DIESEL ENGINE REPAIR**

The mobile power equipment used by industry is primarily powered by three engine types. This was substantiated by the survey results which indicated a statistically significant preference for both small engine and gasoline engine repair. It was therefore decided that a small engine repair course would be added to the curriculum and the existing gasoline engine repair course would be revised and updated. The diesel engine repair course was added to the new curriculum because it is viewed as a logical extension of the skills obtained in the other engine repair courses.

(EQUP 15) EQUIPMENT REPAIR - ELECTRICAL**
(EQUP 16) EQUIPMENT REPAIR - TROUBLE SHOOTING**
(WELD 50) WELDING - OXYACETYLENE
(WELD 51) WELDING - ARC

Due to the high replacement cost of mechanical power equipment, the repair and maintenance of equipment is essential. In addition, skilled technicians are in demand, as indicated by the survey results. Specifically, a significant preference was indicated for both electrical equipment repair skills and equipment trouble shooting skills. Based on these results, it was decided to add courses to the existing curriculum which would address these indicated preferences. The welding courses were determined

*Revised Course
**New Course

to be necessary components of equipment repair, and were therefore retained for the revised program.

(*EQUP 22) SURVEYING SKILLS

Although the need for surveying skills was selected by respondents at a significantly lower rate than expected, the jury of experts determined this to be an essential component of the landscaping industries. In particular, it was believed that students involved in land grading equipment operation must understand elevation differences and basic land measurements. The existing surveying course was therefore revised and retained for inclusion in the new curriculum.

(AGAG 59 or 61) WORK EXPERIENCE
(AGAG 13) SEMINAR IN AGRICULTURAL OCCUPATIONS

"Hands On" is a vital method of learning technical skills. And, while not statistically significant, nearly one-half of the survey respondents indicated a desire for work experience training. This course was therefore retained for inclusion in the new curriculum. The Seminar in Agricultural Occupations class is a course requirement of the Agricultural Sciences Department for all students enrolled in Work Experience.

(AGOR 1) HORTICULTURAL SCIENCE

This course was required for the Landscape Equipment Technology Certificate students. Basic horticulture skills

*Revised Course

and techniques are taught, providing an emphasis on propagation; cultural practices; and the study of plant relationships, structure, growth, and development. While not statistically significant; one-half of the survey respondents designated a business type subfield of Landscape Irrigation and Drainage.

5.3 CURRICULUM DEVELOPMENT

Systematic curriculum development is essential to a strong viable program. "Persons responsible for the contemporary vocational and technical curriculum," as stated by Crunkilton and Finch, "need to ensure that ongoing curricula are considered in relation to what will or may occur in the future."[2] Wiles and Bondi of the University of South Florida wrote:

> Curriculum development, as a process is, today a basic cycle: analysis, design, implementation, and evaluation. This process is applicable to all levels of conceptualization and undergirds all efforts to improve school programs.[3]

Objective 6 of this study was to develop a curriculum for an Equipment Technology Program to fit the needs of the agricultural, industrial, and landscape industries (design). The content of each course is organized by course

---

[2]Crunkilton and Finch, Curriculum Development in Vocational and Technical Education: Planning Content and Implementation p. 16.

[3]Bondi and Wiles, Curriculum Development: A Guide to Practice, 2nd ed. p. 19.

description, objectives, and topical outline. The curriculum development principles recommended by Bondi and Wiles were utilized by organizing development in terms of measurable objectives (analysis). The design step was completed by the development of the course topical outlines. The implementation and evaluation processes were not included in the scope of this study.[4] Content for the core courses established by the Agricultural Sciences Department is shown in Appendix P.

5.4 CONTENT OF THE REQUIRED COURSES

Included in this section is a listing for each required course including its prefix, number, course title, units, lecture hours, and laboratory hours if applicable. The actual course description, objectives, and topical outline by week are presented in the format stipulated by Mt. San Antonio College.

EQUP 1 - SMALL EQUIPMENT OPERATION 2 UNITS
Lecture - 18 hours Laboratory - 54 hours

Selection, operation, repair, and maintenance of power equipment used in the landscape industry. Includes lawnmowers, edgers, weed eaters, blower/vacuum, rototillers, chainsaws, spraying equipment, and all-terrain vehicles. Laboratory includes actual hands-on application and maintenance of this equipment.

---

[4]Bondi and Wiles, Curriculum Development: A Guide to Practice, 2nd ed. p. 19.

OBJECTIVES: (To be able to:)

1. Select proper power equipment for specific use.
2. Operate power equipment safely.
3. Trouble shoot equipment problems.
4. Properly maintain power equipment.
5. Select and operate the proper tools needed for service and repair.

TOPICAL OUTLINE: (by week)

1. Introduction to course and laboratory facility
2. Selection, care and use of hand tools
3. Selection, care and use of power tools
4. Basic fundamentals of small engines
5. Basic repair of small engines
6. 4-cycle engine repair
7. 2-cycle engine repair
8. Engine tune-up
9. Midterm
10. Lawnmower selection, operation, maintenance and repair
11. Weed eater, edger and blower - selection, operation, maintenance & repair
12. Rototiller selection, operation, maintenance and repair
13. Chainsaw selection, operation, maintenance and repair
14. Spraying equipment - selection, operation, maintenance and repair
15. Basic hydraulic maintenance
16. Basic hydraulic repair

17. Pruning equipment - selection, operation, maintenance and repair

18. Final exam

EQUP 2 - TRACTOR OPERATION 2 UNITS
Lecture - 18 hours Laboratory - 54 hours

A course in the operation, service, and adjustment of tractors. Field laboratory emphasizes maintenance, safety, and basic operation of small to medium tractors including 2WD and 4WD.

OBJECTIVES: (To be able to:)

1. Operate 2WD tractor.

2. Operate 4WD tractor.

3. Operate crawler tractor.

4. Operate a backhoe tractor.

5. Hitch 2WD and 4WD, unhitch equipment.

6. Service tractor and equipment.

7. Analyze and evaluate the best procedure to accomplish the specific task.

8. Demonstrate a knowledge in the proper use of equipment and determine when its use is required.

TOPICAL OUTLINE: (by week)

1. Introduction to the course and lab facilities

2. Orientation to tractors, equipment and storage facilities

3. Servicing the tractor

4. Tractor operating controls

5. Driving a tractor - operator's responsibilities and safety

6. Hitching and unhitching drawbar equipment

7. Hitching and unhitching 3-point equipment

8. Hitching and unhitching hydraulics and P.T.O. equipment

9. Midterm exam

10. Major tractor service - changing oil, filter, and fuel filter

11. Operating a 2 wheel drive tractor

12. Operating a 4 wheel drive tractor

13. Operating a crawler tractor with dozer blade

14. Operating a skiploader tractor

15. Operating a backhoe tractor

16. Review tractor components and operation

17. Laboratory final examination

18. Final examination

EQUP 3 - ADVANCED TRACTOR OPERATION 2 UNITS
Lecture - 18 hours Laboratory - 54 hours

An advanced course in the safe tractor operation. Emphasis on development of operational skills. Field laboratory includes precision land grading techniques, using various grading implements, skip-loader, and backhoe operation.

OBJECTIVES: (To be able to:)

1. Grade a drainage ditch

2. Grade a lot requiring specific finish elevations.

3. Operate a backhoe.

4. Operate a skiploader.

5. Operate a land excavator.

6. Analyze and evaluate the best procedure to accomplish the specific task.

7. Demonstrate a knowledge in the proper use of the equipment and determine when its use is required.

TOPICAL OUTLINE: (by week)

1. Introduction to course and lab facility

2. Service and maintenance of tractors

3. Safety and operation
4. Backhoe operation
5. Backhoe operation
6. Skiploader operation
7. Reading cut and fill markers
8. Land grading techniques
9. Midterm
10. Earth moving equipment
11. Land scraper operation
12. Tractor wear points and repair
13. Equipment wear points and repair
14. Skid steer loader operation
15. Front-end loader operation
16. Trenching techniques
17. Laboratory practical exam
18. Final exam

EQUP 10 - HYDRAULICS 3 UNITS
Lecture - 36 hours Laboratory - 54 hours

Operation, maintenance, and repair of hydraulic systems. Emphasis: pumps, valves, cylinders, flow control, reservoirs, lines, motors, and hydrostatic transmissions. Laboratory provides hands-on application of hydraulic systems.

OBJECTIVES: (To be able to:)

1. Demonstrate a knowledge in the principles of hydraulics.
2. Distinguish the uses of hydraulics.
3. Recognize the various types of hydraulic pumps.
4. Recognize the various types of hydraulic valves.
5. Analyze and evaluate hydraulic systems.

6. Demonstrate a knowledge of hydraulic fluids.

7. Diagnose and test hydraulic systems.

TOPICAL OUTLINE: (by week)

1. Introduction to course and facilities
2. Hydraulic principles
3. Pumps
4. Valves
5. Cylinders
6. Motors
7. Accumulators
8. Filters
9. Midterm exam
10. Reservoirs, oil coolers, hoses and fittings
11. Hydraulic seals
12. Fluids
13. Hydrostatic motors
14. Hydrostatic transmission
15. General maintenance
16. Hydraulic applications
17. Diagnosis and testing
18. Final exam

EQUP 11 - SMALL ENGINE REPAIR 2 UNITS
Lecture - 18 hours Laboratory - 54 hours

Principles and repair of small engines used in landscape, industrial, and agricultural applications. Includes repair of lawnmowers, chainsaws, 2 cycle engines, 4 cycle engines, spraying equipment, all-terrain vehicles, and other related gasoline powered equipment.

OBJECTIVES: (To be able to:)

1. Distinguish the different types and systems of small engines.
2. Identify major parts of an engine.
3. Select the proper hand tools.
4. Disassemble a small engine.
5. Reassemble a small engine.
6. Diagnose small engine problems.

TOPICAL OUTLINE: (by week)

1. Introduction to course and lab facilities
2. Shop safety and hand tool identification
3. Small engine parts identification.
4. Principles of two and four stroke cycle engines
5. Small engine lubrication systems
6. Small engine cooling systems
7. Carburetion and fuel systems
8. Ignition systems
9. Midterm exam
10. Engine specifications, maintenance and service manuals
11. Repair manuals
12. Cylinder and block reconditioning
13. Rods, bearings, valves and cylinder head reconditioning
14. Engine overhaul procedures
15. Using a micrometer and other measuring devices
16. Engine tune-up
17. Trouble shooting - diagnostic procedures
18. Final exam

EQUP 12 - GASOLINE ENGINE REPAIR 2 UNITS
Lecture - 18 hours Laboratory - 54 hours

Repair and maintenance of gasoline engines used to power industrial, landscape, and agricultural equipment. Students gain actual hands-on experience maintaining and repairing gasoline engines.

OBJECTIVES: (To be able to:)

1. Identify gasoline engine types.
2. Understand the principles of engine operation.
3. Properly maintain gasoline engines.
4. Disassemble and reassemble a gasoline engine.
5. Accurately measure engine wear points.
6. Diagnose engine problems.
7. Repair an engine.

TOPICAL OUTLINE: (by week)

1. Introduction
2. Engine theory and history
3. 4 stroke and 2 stroke principles
4. Safety in the shop and safe use of tools
5. Disassembling an engine and identification of parts
6. Cleaning disassembled engine parts
7. Inspecting and checking tolerences of engine parts
8. Ordering engine parts and gaskets
9. Midterm exam
10. Reconditioning cylinder heads
11. Reconditioning crankshafts and camshaft
12. Reconditioning crankshafts and camshaft
13. Carburetion systems
14. Ignition systems

15. Starting systems

16. Reassembly of engine

17. Reassembly of engine

18. Final exam

EQUP 13 - DIESEL ENGINE REPAIR 2 UNITS
Lecture - 18 hours Laboratory - 54 hours

Repair and maintenance of diesel engines used to power industrial, landscape, and agricultural equipment. Students gain actual hands-on experience maintaining, servicing, and repairing diesel engines.

OBJECTIVES: (To be able to:)

1. Distinguish the different types and systems of diesel engines.

2. Identify the components of the engine.

3. Understand the operational concepts of the diesel engine.

4. Disassemble a diesel engine and prepare it for overhaul.

5. Reassemble a diesel engine and prepare it for operation.

TOPICAL OUTLINE: (by week)

1. Introduction to course and lab facilities.

2. Shop safety and hand tool identification

3. History and development of diesel engines

4. Understanding the diesel concept

5. Identifying diesel engine components

6. Using precision measuring devices

7. Air intake and exhaust systems

8. Engine cooling systems

9. Midterm

10. Fuel injector types

11. Injector testing and repair
12. Fuel injection pump types
13. Fuel injection pump repair
14. Engine governors
15. Turbocharger
16. Engine electrical system
17. Trouble-shooting and diagnostic procedure
18. Final exam

EQUP 14 - POWER TRAIN REPAIR 2 UNITS
Lecture - 18 hours Laboratory - 54

Service, maintenance, and repair of power trains. Students gain experience with clutches, transmissions, differentials, final drives, and power take off units used to transmit power on tractors.

OBJECTIVES: (To be able to:)

1. Distinguish the different types of power trains.
2. Recognize the various components of power trains.
3. Analyze power train systems.
4. Evaluate power train components.
5. Disassemble and reassemble a power train unit.

TOPICAL OUTLINE: (by week)

1. Introduction to course and lab facilities
2. Power train principles
3. Shop safety and hand tool identification
4. Clutches
5. Clutch service, maintenance, and repair
6. Mechanical transmissions
7. Mechanical transmission service, maintenance, and repair

8. Hydraulic assist transmission
9. Midterm
10. Hydrostatic drives
11. Torque converters
12. Differentials
13. Final drives
14. Mechanical front wheel drive
15. Power take-offs
16. Special drives
17. Trouble-shooting
18. Final exam

EQUP 15 - EQUIPMENT REPAIR - ELECTRICAL 1 UNIT
Lecture - 9 hours Laboratory 27 hours

Service, maintenance, and repair of tractor electrical systems. Students gain experience in electrical wiring, voltage regulators, generators, alternators, switches, gauges, batteries, and test equipment.

OBJECTIVES: (To be able to:)

1. Demonstrate a knowledge of electrical systems.
2. Demonstrate a knowledge of testing equipment and tools.
3. Test electronic ignition systems.
4. Test starting circuits.
5. Analyze and evaluate electrical problems.

TOPICAL OUTLINE: (by week)

1. Introduction of course, laboratory and electricity
2. Test equipment and tools
3. Batteries and charging circuits
4. Starting circuits

5. Midterm, ignition circuits

6. Electronic ignition system

7. Lighting and accessory circuits

8. Diagnosis and testing of electrical systems

9. Final exam

EQUP 16 - EQUIPMENT REPAIR - TROUBLE SHOOTING 1 UNIT
Lecture - 9 hours Laboratory - 27 hours

Analysis and evaluation of tractor power failure. Students gain actual experience in the proper diagnostic procedures of power equipment.

OBJECTIVES: (To be able to:)

1. Demonstrate a knowledge of diagnostic procedures.

2. Demonstrate a knowledge of testing gasoline and diesel engines.

3. Demonstrate a knowledge of testing electrical systems.

4. Demonstrate a knowledge of testing power trains.

5. Describe a method of repair after analysis.

TOPICAL OUTLINE: (by week)

1. Introduction to course, lab facilities and trouble-shooting

2. Testing equipment

3. Gasoline engine diagnostic

4. Diesel engine diagnostic

5. Midterm

6. Electrical diagnostic - starting system

7. Electrical diagnostic - lighting circuits, electrical system

8. Power train

9. Final exam

EQUP 22 - SURVEYING SKILLS 1 UNIT
Lecture - 9 hours Laboratory - 27 hours

A course in the basic theory of land measurement. The class will include area measurements, plane table, topographic mapping, and elevation measurement. The care, uses, and adjustments of instruments in field work will be covered.

OBJECTIVES: (To be able to:)

1. Care for, use, and adjust surveying instruments in field work.
2. Set grade stakes for cut and fill indicators.
3. Interpret tract map for location of property lines.
4. Draw a plot plan using a plane table and stadia measurement.
5. Measure horizontal distances.
6. Determine elevation changes.

TOPICAL OUTLINE: (by week)

1. Introduction to course and fundamentals of measurement
2. Measurement of distance by pacing and chaining
3. Leveling, two peg test, differential leveling
4. Profile leveling, stadia measurements
5. Leveling for earthwork, shooting grades
6. Use of a builder's level
7. Use of a transit
8. Plane table mapping
9. Final exam

WELD 50 - WELDING--OXYACETYLENE 2 UNITS
Lecture - 18 hours Laboratory - 54 hours

A course in the fundamentals of oxyacetylene welding, brazing, and cutting. Develops an understanding of the fundamental skills in modern welding practices.

OBJECTIVES:

1. To develop skill in oxyacetylene welding.

2. To develop an understanding of the characteristics of metals and their reaction to the welding processes.

3. To develop an appreciation for and the ability to properly maintain welding equipment.

4. To learn safe and efficient operation of welding equipment.

TOPICAL OUTLINE: (by week)

1. Safety--Familiarization with safety practices and introduction

2. Principles of fusion welding with oxyacetylene gas Assembling equipment, lighting and adjusting a torch

3-4. Principles of fusion welding with oxyacetylene gas, continued
Practice in oxyacetylene welding, running beads without rod

5-6. Welding symbols, types of flat welds
Practice in oxyacetylene welding, running beads without rod

7-8. Properties of metals
Practice in oxyacetylene welding, running beads with rod

9-10. Expansion and contraction
Practice in oxyacetylene welding, flat butt welds

11. Midterm examination
Practice in oxyacetylene welding, running beads

12-14. Oxyacetylene welding of common metals alloys
Practice in oxyacetylene welding, fillet welds

15-16. Principles of oxyacetylene cutting
Practice in oxyacetylene cutting

17. Principles of nonfusion welding
Practice in brazing

18. Final examination

WELD 51 - WELDING--ARC 2 UNITS
Lecture - 18 hours Laboratory - 54 hours

A course in the fundamentals of basic arc welding, welding symbols, and standard and alloy electrode selection. Course includes hard facing equipment, wear points, and welding repairs associated with tractors and equipment.

OBJECTIVES:

1. The development of proficient arc welding skills and practices.
2. To supplement the student's vocational experience.
3. To provide knowledge of modern arc welding equipment and practices.
4. To instill a knowledge and respect for safe arc welding procedures.

TOPICAL OUTLINE: (by week)

1. Safety practices and introduction to arc welding
2. Lecture on welding rod, correct polarity, striking arc and beads
3. Practice in running flat beads
4. Practice in running flat beads, forehand and backhand
5. Lecture-basic weld symbols - evaluate work
6. Practice flat overlap beads (Film - Preventing Distortion)
7. Practice flat overlap beads horzontal
8. Practice fillet welds (flat)
9. Practice fillet welds (horizontal)
10. Practice fillet welds and testing (distructive)
11. Film (Arc Welding in Industry) Lincoln Company
12. Lecture on butt welds and practice
13. Butt weld practice and lecture on symbols
14. Butt weld testing and evaluating coupons

15. Vertical weld practice flat plates

16. Vertical weld practice lap plates

17. Vertical weld practice fillet and V goove plates

18. Final examination (welding test and evaluation of work completed)

AGAG 59 - WORK EXPERIENCE 1 UNIT
75 paid hours 60 non-paid hours

A course designed to provide students with actual on-the-job experience in an approved work location which is related to classroom instruction. A minimum of five hours per week of supervised work (minimum 75 paid clock hours or 60 non-paid clock hours per semester) is required for each one unit of credit.

OBJECTIVES:

1. To provide the student the opportunity to obtain actual work experience on the job.

2. To teach the dignity of work and good work habits.

3. To help students learn by doing.

TOPCIAL OUTLINE:

A regular topical outline is not followed in this course. This course is designed for students to gain on-site work experience and are required to keep a daily log of their activities.

AGAG 61 - WORK EXERIENCE 3 UNITS
225 paid hours 180 non-paid hours

A course designed to provide students with actual on-the-job experience in an approved work location which is related to classroom instruction. A minimum of five hours per week of supervised work (minimum 75 paid clock hours or 60 non-paid clock hours per semester) is required for each one unit of credit.

OBJECTIVES: (To be able to:)

1. To provide the student the opportunity to obtain actual work experience on the job.

2. To teach the dignity of work and good work habits.

3. To help students learn by doing.

TOPICAL OUTLINE:

A regular topical outline is not followed in this course. This course is designed for students to gain on-site work experience and are required to keep a daily log of their activities.

AGOR 1 - HORTICULTURAL SCIENCE 3 UNITS
Lecture - 54 hours

A course in the basic horticulture skills and techniques for use in gardening, nursery, and forest applications. Emphasis on propagation, cultural practices, and the study of plant relationships, structure, growth, and development.

OBJECTIVES: (To be able to:)

1. To develop a practical knowledge of plant structure, function, nomenclature, and classification.

2. Become familiar with climate and how it influences plant growth.

3. To develop an understanding of different types of soils and how they can be managed or manipulated to improve plant growth.

4. To become familiar with the nutrients essential for plant growth, recognize deficiencies, and correct use of fertilizers.

5. To develop a practical knowledge of irrigation practices.

6. To develop an understanding of pruning and some practical applications on common plants.

7. To develop a practical knowledge of common turfgrasses used in Southern California, their planting and maintenance.

8. To become familiar with several methods of asexual propagation.

9. To become familiar with methods of seed propagation.

10. To develop a practical knowledge of proper planting and transplanting methods.

11. To become familiar with common plant dieseases, insects, pests, and weeds in the garden and their control.

12. To develop a practical knowledge of selection and production of common fruit and vegetables for Southern California.

13. To become familiar with careers in horticulture and related fields.

TOPICAL OUTLINE: (by week)

1. Introduction to horticulture and climate

2. Horticultural Botany: Plant nomenclature - plant processes

3. Horticultural Botany: Plant structure - light and temperature

4. Soils

5. Fertilizers

6. Irrigation practices

7. Pruning

8. Turf selection and maintenance

9. Cutting propagation

10. Seed propagation

11. Grafting and budding

12. Planting and transplanting

13. Vegetable production and selection

14. Plant diseases

15. Insect pests and weed control

16. Fruit production and selection

17. Careers in horticulture and related fields

18. Final exam

5.5 SUMMARY

In consultation with the jury of experts, it was decided that, based upon the results of the survey, the existing Mechanized Agriculture Program was not fully satisfying the competency needs of the urban employment market. It was therefore concluded that modification of the existing program was warranted. It was additionally decided to rename the Mechanized Agriculture Program. As a result, the Equipment Technology Program was created, based upon the old program. The revised program consisted of an Associate in Science degree requiring twenty-four units of general education, eleven and one-half units of core courses and either twenty-five or twenty-six units of required courses. The Equipment Technology Certificate was composed of twenty-six units of required courses and the Landscape Equipment Technology Certificate had twenty-five units of required courses. The required courses were developed or revised to train individuals in basic operational and mechanical skills for job placement and advancement in an urban community.

Curriculum was developed to fit the needs of the agricultural, industrial, and landscape businesses. Specifically, the curriculum was designed to include existing coursework, new coursework, and existing courses with modifications as suggested by the survey results. The Equipment Technology Program and curriculum were submitted

for review to the Mt. San Antonio College Curriculum Committee. Approval was granted in April, 1988 and implementation began September, 1988.

VI. SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

6.1 SUMMARY AND CONCLUSIONS

In an overview of the Power and Machinery Technology subdivision of Agricultural Engineering, William J. Howard, retired executive engineer for Ford Tractor Operation, stated: "...the agricultural industry has undergone a major reorientation over the past ten years in moving from a domestically oriented business to a global industry."[1]

This major reorientation has affected individual communities and forced them to re-evaluate the focus of agriculture. To determine the needs of a post-secondary Mechanized Agriculture Program in an urban community, this study limited its scope to a single community college in Southern California. The history of the Mechanized Agriculture Program at Mt. San Antonio College and the degree of community urbanization from 1946 to 1987 were investigated. It was established in the background and need for the study that due to increasing urbanization and encroachment of industry and commercial establishments in

---

[1]William J. Howard, "Power and Machinery," Agricultural Engineering, March 1987, p. 15.

the Mt. San Antonio College service area, the Mechanized Agriculture Program should be re-evaluated.

A thorough review of literature covering the role of California community colleges and vocational education, research methodology, and curriculum development was completed. A search for other studies was conducted, and it was concluded that no studies had been done that provided relevance to a mechanized agriculture or equipment related community college program in an urban area. The sixty-six Southern California community college catalogs were reviewed for programs in mechanized agriculture and equipment related fields. Twenty-two colleges offered such programs. A competitive program was not found that incorporated agricultural, industrial, and landscape courses in a single program. This fact further substantiated a need for modifying the existing Mechanized Agriculture Program.

To research the feasibility of revising the Mt. San Antonio College, Mechanized Agriculture Program, a jury of experts was assembled and an interview was conducted. It was determined that program revision was both feasible and necessary. Furthermore, the jury of experts established a new program title of Equipment Technology to replace the old title of Mechanized Agriculture. In addition, a list of recommendations was developed to give direction to the revision process. (Objective 1)

To follow up on the recommendations of the jury of experts, a mail survey was developed and distributed to a

sample population of 355 organizations in the pre-defined 20-mile radius of Mt. San Antonio College. The return rate was 17.2 percent. Survey data were analyzed by frequency distributions and Chi-squared statistics, as appropriate. (Objective 2) The jury of experts determined the survey findings to be both valid and adequate enough in detail to proceed with program revision.

Curriculum development practices recommended by Bondi and Wiles were used as a guideline in carrying out this study. Their recommendations outlined four major steps in creating or modifying curricula/programs: (1) Analysis-Identification of needs; (2) Design of curricula/program; (3) Implementation of curricula/program; and (4) Evaluation of the outcomes.[2] The first two steps were utilized in guiding this study. Quantitative and qualitative analysis of the specific technical skills survey responses identified the power and machinery compentencies needs. (Objective 3) The jury of experts and the Mt. San Antonio College Agricultural Science Department concluded that the existing Mechanized Agriculture Program was not satisfying the competency needs of the urban employment market. (Objective 4)

The existing mechanized agriculture curriculum was updated by modifying existing courses in and adding new courses to the program requirements. The actual course

---

[2]Bondi and Wiles, Curriculum Development: A guide to Practice, 2nd ed. p. 19.

description, objectives, and topical outline were developed for each required course. (Objectives 5 and 6)

As a result, it was decided that the newly formed Equipment Technology Program would offer an Associate in Science degree and two certificate options: (1) Equipment Technology; and, (2) Landscape Equipment Technology. The Associate in Science degree required twenty-four units of general education, eleven and one-half units of core courses and remaining required coursework to be selected from either of the certificate options. The Equipment Technology Certificate consisted of twenty-six units of required courses. The Landscape Equipment Technology Certificate consisted of twenty-five units of required coursework. (Objective 5)

In the opinion of the jury of experts, the curriculum principles applied in identifying the need and designing the curriculum was effective.[3] The results of the study tend to support their observations. Final approval for the program revision and curriculum was was granted Spring, 1988 by the Mt. San Antonio College Curriculum Committee. Implementation of the revised curriculum began September, 1988. The remainder of this section contains additional conclusions.

Survey respondents indicated that the typical starting salary for equipment technicians ranged from $12,000 to $20,000 per year. This should prove meaningful to

---

[3]Ibid.

prospective equipment technology students in their career planning efforts.

Respondents showed a clear preference for their employees to have obtained a certificate in equipment technology. This was reinforced by their identifying employees with certificates as their most productive employees. Survey respondents also showed a preference for certificate programs of short duration, with classes convening during the evening.

Nearly one-half of the surveyed population desired a training program at Mt. San Antonio College. Over one-third of the respondents indicated a willingness to provide program support. In addition, one-third indicated a desire to be on an advisory committee. This committee should convene biannually to assist in reviewing and evaluating the opportunities for curriculum, employment, equipment, industry needs, and program marketing strategies. A decided atmosphere of inadequacy with the existing Mechanized Agriculture Program was indicated by the survey results. This feeling of program inadequacy should be ameliorated as the effects of the Equipment Technology Program are felt in the surrounding urban industrial community.

6.2 RECOMMENDATIONS FOR FUTURE STUDY

A number of recommendations were suggested by the results of this study. A summary of each suggestion follows below.

Replications of this study should be conducted on a regular basis to ensure Mt. San Antonio College remains sensitive to the needs of the surrounding urban industrial community. However, small pilot studies should be conducted first to test the survey instrument. This will optimize the validity and reliability of the procedure. The current survey instrument could be refined to incorporate a five point Likert scale that would allow for discrete categorical responses, which will simplify analysis and interpretation.

Replications of this study should be conducted in other community college service areas. The results could be valuable in terms of evaluating urban and geographic variability across areas. This could also provide a means for other post-secondary two-year institutions offering agriculture programs in the State of California and potentially throughout the United States to evaluate the needs of their surrounding urban industrial community.

Regular evaluations of the Equipment Technology Program should be conducted to determine its effectiveness in meeting the industry and market needs of the surrounding businesses and community during the implementation phase.

The feedback from the assesment process would provide a basis for further curricula modification.

Follow up surveys of equipment technology graduates and employees could be conducted as further program evaluation. This feedback may augment employer satisfaction and needs analyses.

Workshops and seminars sponsored by Mt. San Antonio College could be developed to offer customized training programs for individual businesses.

An investigation could be conducted of professional organizations whose involvement or association would benefit the program. An industry sponsorship program could also be established to encourage and facilitate any appropriate services or donations. Both of these actions should provide additional and necessary community involvement. They should also build on the concept of a partnership between education and the urban industrial community.

In modifying curricula of other mechanized agriculture programs, the author should follow the steps and procedures outlined in this study, with the following exceptions:

1. Design of the survey questionnaire should coincide with appropriate statistical methods that will produce viable results.

2. Careful considerations should be taken in development of the questions so that they contain no bias and that they are clear and concise.

3. Questions should be designed utilizing a five point Likert scale that would allow each response to be scored by how strongly they agree or disagree.[4]

4. A pilot study should be conducted to test the survey instrument.

5. Follow-up procedures would include letters and/or telephone calls so that a statistically acceptable response rate is potentially obtainable.

---

[4]D. A. de Vause, Surveys in Social Research, (Boston: George Allen and Unwin, 1986) p. 75 and 86-88.

APPENDICES

APPENDIX A

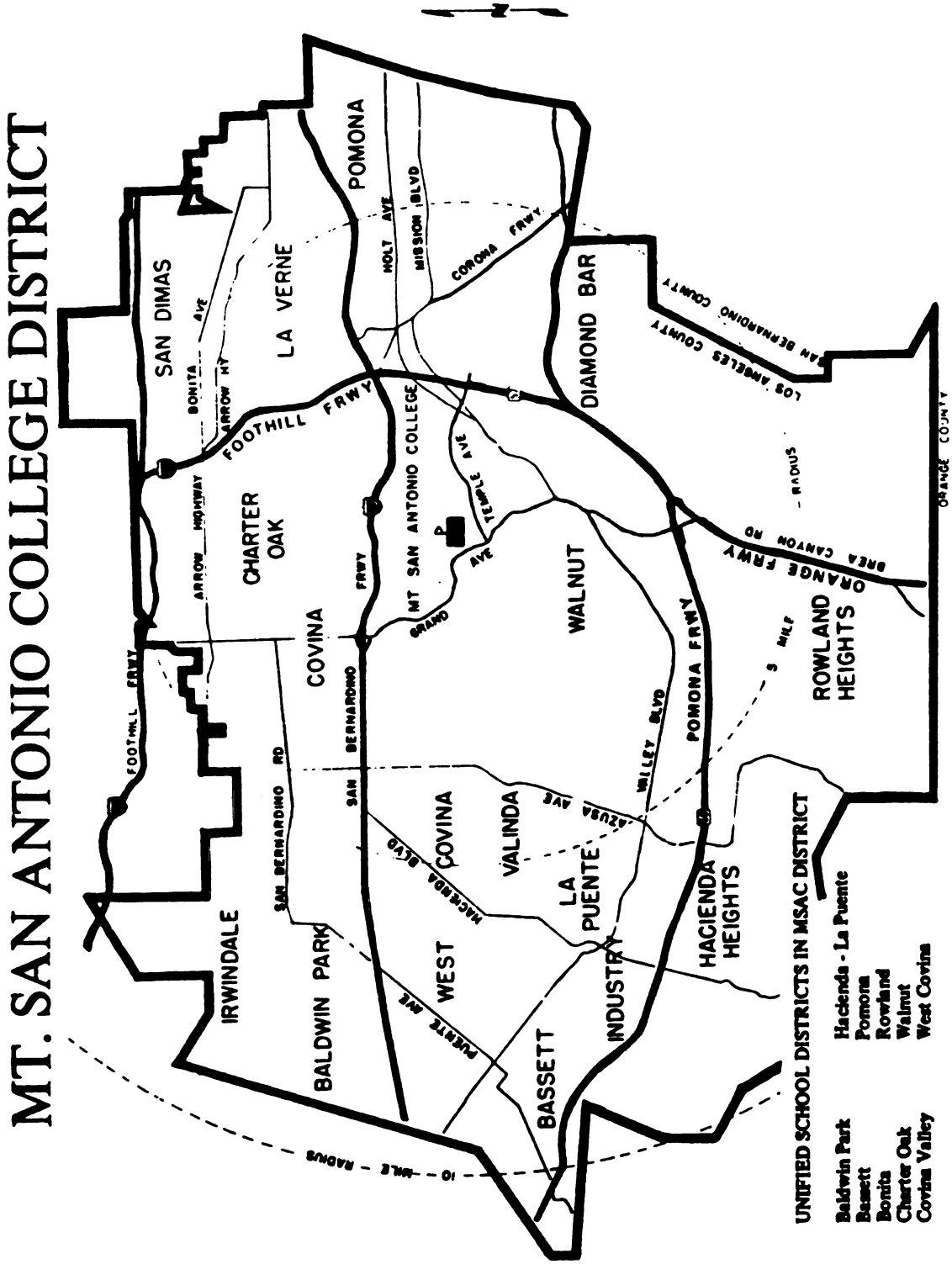
APPENDIX A

SURVEY AREA MAP

APPENDIX B

APPENDIX B

MT. SAN ANTONIO COLLEGE DISTRICT MAP



APPENDIX C

APPENDIX C

MT. SAN ANTONIO COLLEGE COURSES OF STUDY 1950s

AGRICULTURAL ENGINEERING
Vocational

The vocational program is designed to teach the skills necessary for the operation of a modern mechanical farm. It is for the student wishing to go into farming or to seek employment on a ranch or farm with a mechanical program. There is opportunity to gain actual experience under the supervised farming program on the school farm.

FRESHMAN YEAR

	FALL Units	Spring Units
Farm Surveying AE54	3	
Farm Machinery AE52	2	
Farm Machinery AE53		2
Farm Mechanics Conference and Project	1-5	1-5
Technical Drawing 21A-21B	2	2
Math 60A-60B	3	3
Soil Science SS54	3	
Fertilizers and Fertilizer Practices SS55		3
Ranch Management AG97A-AG97B	1-3	1-3
Psychology of Personal Adjustment 2	2	
Electives		4
Physical Education	0.5	0.5
TOTAL	17.5	16.5

SOPHOMORE YEAR

	FALL Units	SPRING Units
Agricultural Mechanics AE50	2	
Agricultural Mechanics AE51		2
Farm Mechanics Conference and Projects	1-5	1-5
Ranch Management AG97C-AG97D	1-3	1-3
Soil Management SS57	3	
Irrigation and Drainage SS56		3
American Institutions 10	2	
United States History 27		2
Feeds and Feeding AS51	3	
English	3	
Hygiene 1		2
Electives	2	3
Physical Education	0.5	0.5
TOTAL	17.5	16.5

AGRICULTURAL ENGINEERING
California Polytechnic Transfer

The function of the program in Agricultural Engineering is to train students in the selection, operation, maintenance, and repair of structures and equipment used in modern agriculture. Students get practical application of their work in the required supervised farming program. The shop facilities offer the student the chance to gain experience in the use of the many tools and equipment necessary in a farm shop. He also must learn to operate the various units of farm power and machinery that are available on the school farm.

In project work the student has the opportunity to design and construct various mechanical devices used on the modern farm.

This curriculum is planned to prepare the student for transfer to a four year college, leading to a Bachelor of Science degree with a major in Agricultural Engineering.

FRESHMAN YEAR

	FALL Units	SPRING Units
Farm Machinery AE12	2	
Farm Machinery AE13		2
Farm Mechanics Conference and Project	1-5	1-5
Psychology 1A	3	
Technical Drawing 21A-21B	2	2
Mathematics D-C	3	3
Physics 1A		5
Soil Science SS14	3	
Plant Science Elective	3	3
American Institutions 10		2
Physical Education	0.5	0.5
TOTAL	17.5	18.5

SOPHOMORE YEAR

	FALL Units	SPRING Units
Agricultural Mechanics AE10	2	
Agricultural Mechanics AE11		2
Farm Mechanics Conference and Project	1-5	1-5
Soil Management SS17	3	
Irrigation and Drainage SS56		3
Animal Science Elective		3
Economics 1A-1B	3	3
English 1A-1B	3	3
Surveying 1A	3	
United States History 27	2	
Hygiene 1		2
Physical Education	0.5	0.5
TOTAL	17.5	17.5

APPENDIX D

APPENDIX D

MT. SAN ANTONIO COLLEGE COURSES OF STUDY 1960s

AGRUCULTURAL MECHANICS
Vocational

The vocational program is designed to teach the skills neccessary for the operation of a modern mechanical farm. It is for the student wishing to go into farming or to seek employment on a ranch or farm with a mechanical program. There is opportunity to gain actual experience under the supervised farming program on the school farm.

FRESHMAN YEAR

	FALL Units	SPRING Units
Agricultural Mechanics AE91L-AE92L	1	1
Ranch Management AG90A-AG90B	3	3
Farm Surveying AE55	2	
Soil Science SS50	3	
American Institutions 10		2
Health Education 1		2
Technical Mathematics 60A-60B	3	3
Technical Drawing 21A-21B	2	2
Farm Management Skills AG93A-AG93B	1	1
General Horticulture OH94		2
Psychology of Personal Adjustment 2	2	
Fruit Production OH93L		1
Physical Education	0.5	0.5
TOTAL	17.5	17.5

SOPHOMORE YEAR

	FALL Units	SPRING Units
Farm Tractors AE54	2	
General Farming AG92B	2	
Farm Machinery AE93L-AE94L		1
Truck and Field Corps CP91L	1	
Ranch Management AG90C-AG90D	3	3
Irrigation and Drainage SS51		3
English 54		3
Crop Production CP94		2
United States History 27	2	
Livestock Production AH95B		2
Farm Management Skills AG93C-AG93D	1	1
Crops Conference and Projects CP90A-CP90B	1-5	1-5
Electives	3	
Physical Education	0.5	0.5
TOTAL	16.5	16.5

AGRICULTURAL ENGINEERING
California Polytechnic Transfer

The function of the program in Agricultural Engineering is to train students in the selection, operation, maintenance, and repair of structures and equipment used in modern agriculture. Students get practical application of their work in the required supervised farming program. The shop facilities offer the student the chance to gain experience in the use of the many tools and equipment necessary in a farm shop. He also must learn to operate the various units of farm power and machinery that are available on the school farm.

FRESHMAN YEAR

	FALL Units	SPRING Units
College Algebra 1	3	
Analytic Geometry and Calculus 3A-3B	3	3
Physics 4A		4
English 1A-1B	3	3
Engineering Drawing 22	2	
Psychology 1A		3
Farm Tractors AE14	2	
Health Education 1	2	
Farm Machinery AE12-AE13	2	2
Agronomy CP11		3
Physical Education	0.5	0.5
TOTAL	17.5	18.5

SOPHOMORE YEAR

	FALL Units	SPRING Units
Differential and Integral Calculus 4A-4B	5	3
Physics 4B-4C	4	4
Economics 1A-1B	3	3
History of the United States 7A-7B	3	3
Agricultural Mechanics 10-11	2	2
Irrigation and Drainage SS12		3
Physical Education	0.5	0.5
TOTAL	17.5	18.5

APPENDIX E

APPENDIX E

MT. SAN ANTONIO COLLEGE COURSES OF STUDY 1970s

AGRICULTURAL ENGINEERING TECHNOLOGY

The vocational program is designed to teach the skills neccessary for the operation of a modern mechanical farm. It is for the student wishing to go into farming or to seek employment on a ranch or farm with a mechanical program. There is opportunity to gain actual experience under the supervised farming program on the school farm.

Major Courses	UNITS
Agricultural Mechanics AE50	2
Agricultural Mechanics AE51	2
Farm Machinery AE52	2
Farm Tractors AE54	2
Farm Surveying AE55	3
Agricultural Mechanization AE56	2
Soil Science SS50	3
Agricultural Mathematics AG91	3
Seminar in Agricultural Occupations AG13	1
Technical Drawing 21A	2
Technical Drawing 21B	2
Welding 50	2
General Education	12

Recommended Electives	
Internal Combustion Engines AE57	2
Agricultural Science AG94	3
Agricultural Sales and Service AB63	3
Introduction to Agricultural Economics AB50	3
Ranch Management AG90A-AG90E	2-10
General Farming AG92B	2
Truck and Field Crops CP91L	1
Crop Production CP94	2
Livestock Production AH95B	2
Machine Tool Processes 90, 90L	2
Technical Physics 15A	3
Welding Arc 70B	2
Welding Heliarc 70D	2

AGRICULTURAL ENGINEERING
California Polytechnic Transfer

The function of the program in Agricultural Engineering is to train students in the selection, operation, maintenance, and repair of structures and equipment used in modern agriculture. Students get practical application of their work in the required supervised farming program. The shop facilities offer the student the chance to gain experience in the use of the many tools and equipment necessary in a farm shop. He also must learn to operate the various units of farm power and machinery that are available on the school farm.

FRESHMAN YEAR

	FALL Units	SPRING Units
Agricultural Mechanics AE10-11	2	2
Agricultural Mechanization AE16		2
Farm Tractors AE14	2	
College Algebra 1	3	
Chemistry 1A-B	5	5
Engineering Drawing 22	2	
Programming Digital Computers 12		2
Crop Production (elective)		3
English 1A		3
Psychology 1A	3	
Guidance 50	0.5	
Physical Education	0.5	0.5
TOTAL	18	17.5

SOPHOMORE YEAR

	FALL Units	SPRING Units
Farm Machinery AE12	2	
Soil Science SS10	3	
English 1B		3
Agriculture (elective)		3
Surveying 1A	3	
Irrigation and Drainage SS10		3
Mathematics 33A-33B	5	3
Health Education 1	2	
History of the United Sates 1	3	
Political Science 1		3
Speech 1A		3
Physical Education	0.5	0.5
TOTAL	18.5	18.5

APPENDIX F

APPENDIX F

MT. SAN ANTONIO COLLEGE COURSES OF STUDY 1980s

ASSOCIATE IN SCIENCE DEGREE IN MECHANIZED AGRICULTURE

Core Courses:

AGAG 5	Agriculture Industry Orientation (must be taken by first semester Agriculture Majors)
AGAG 91	Agricultural Calculations
AGMC 20	Agricultural Mechanics

This program is intended to prepare students for employment following graduation. Students desiring a Bachelor's Degree (transfer program) should consult with a counselor to discuss transferability of courses.

The curriculum places emphasis on the applied mechanical phases of agriculture. Students are allowed flexibility to specialize in a given area of agriculture, depending on their previous experience or current career goals.

Required Courses (the Core Courses listed above plus):

AGAB 20	Microcomputers in Agriculture
AGMC 14	Farm and Industrial Tractor Operation
AGMC 21	Farm Construction
AGMC 57	Internal Combustion Engines
AGOR 12	Environmental Vegetable Gardening
WELD 50	Welding

Restricted Electives (a minimum of one course must be selected from the following list):

AGLI 10	Dairy Production
AGLI 14	Swine Production
AGLI 16	Horse Production
AGLI 17	Sheep Production
AGLI 30	Beef Production

Restricted Electives (a minimum of one course must be selected from the following list):

AGAB 10	Introduction to Agri-Business
AGAB 11	Agricultural Economics
AGAB 12	Marketing Agricultural Products
AGAB 23	Agricultural Sales and Service

POWER AND MACHINERY CERTIFICATE

Required Courses:

AGAB 20	Microcomputers in Agriculture
AGMC 14	Farm and Industrial Tractor Operation
AGMC 21	Farm Construction
AGMC 57	Internal Combustion Engines
AGOR 12	Enviromental Vegetable Gardening
WELD 70A-70B-70C	Welding, Arc and Heli-Arc

Restricted Electives (a minimum of one course must be selected from the following):

AGLI 10	Dairy Production
AGLI 14	Swine Production
AGLI 16	Horse Production
AGLI 17	Sheep Production
AGLI 30	Beef Production

Restricted Electives (a minimum of one course must be selected from the following list):

AGAB 10	Introduction to Agri-Business
AGAB 11	Agricultural Economics
AGAB 12	Marketing Agricultural Products
AGAB 23	Agricultural Sales and Service

HORTICULTURE EQUIPMENT TECHNICIAN CERTIFICATE

Curriculum is skilled-oriented and derived from input of industry professionals and horticulture technicians from local businesses and professional organizations. Information taught is intended to provide entry-level skills or upgrade skills of employment for employees presently working in the field who want to enhance their skills and increase their income.

Required Courses:

AGMC 14	Farm and Industrial Tractor Operation
AGMC 23	Horticulture Power and Equipment
AGOR 1	Horticulture Science
AGOR 60	Turf Grass Management
AGOR 62	Turf Irrigation Management and Design, or
AGOR 63A	Landscape Irrigation Design, and
AGOR 63B	Landscape Irrigation Installation
AGOR 75	Aboriculture, or
AGOR 75A	Tree Pruning and Repair

APPENDIX G

APPENDIX G

TABLE A.1 -- Population Comparison Of The Mt. San Antonio College District Cities - 1984-1986

CITY	January 1984	January 1986	% of CHANGE
Baldwin Park	55,398	59,900	8.13
Covina	36,846	40,600	10.19
Industry	679	620	-8.69
Irwindale	1,110	1,060	-4.50
La Puente	31,226	32,850	5.20
La Verne	25,802	27,550	6.77
Pomona	103,774	112,800	8.70
San Dimas	26,931	28,550	6.01
Walnut	13,130	20,700	57.65
West Covina	85,737	91,000	6.14

Source: California Department of Finance, Population Unit and Mt. San Antonio College Institutional Research

APPENDIX H

APPENDIX H

Table A2 -- Catalog Review of Southern California Community Colleges Offering Degrees, Certificates or Support Courses In Mechanized Agriculture Or Equipment Related Fields

COMMUNITY COLLEGE	DIESEL TECHNOLOGY	HEAVY EQUIPMENT	INDUSTRIAL EQUIPMENT	LANDSCAPE EQUIPMENT	MECHANIZED AGRICULTURE
ALLAN HANCOCK	C,D		C,D		
BAKERSFIELD					D
CABRILLO				SC	
* CERRITOS				C	
* CITRUS	C,D				
COLLEGE OF THE DESERT	C,D			C,D	C,D
COLLEGE OF THE SEQUOIAS					D
CUYAMACA				SC	
FRESNO CITY	C	C			
* FULLERTON				SC	
HARTNELL					C,D
IMPERIAL VALLEY			D	D	D
KINGS RIVER					D
LONG BEACH CITY	D				
LOS ANGELES TRADE-TECHNICAL	C,D	C,D			
MIRAMAR	C,D				
MIRA COSTA				SC	
MOUNT SAN ANTONIO					C,D
ORANGE COAST					SC
OXNARD			D		D
SOUTHWESTERN	C,D			C,D	
WESTHILLS	C,D		C,D		C,D

* Colleges within the 20 mile radius of Mt. San Antonio College

(C--Certification, D--Degree, SC--Support Course)

APPENDIX I

APPENDIX I

JURY OF EXPERTS ROSTER

Covina Valley Unified School District
Vernon Lott, Assistant Director of Personnel
519 East Badillo
Covina, CA 91723

Baldwin Park Unified School District
Kark Fekete, Director of Maintenance & Operations
3699 North Holly Avenue
Baldwin Park, CA 91706

City of Azusa
Robert DeLoach, Public Works Director
213 E. Foothill Blvd.
Azusa, CA 91702

City of West Covina
Morris Wolff, Maintenance Director
P.O. Box 1440
West Covina, CA 91793

Chino Welding and Assembly
Sam Lewis, Owner
16379 Chino Corona Rd.
Chino, CA 91710

C.R. Cook Ford Tractors
Bob Cook, Owner
14550 E. Garvey Blvd.
Baldwin Park, CA 91706

Glenn B. Dorning, Inc.
Bill Ellis, Sales Representative
1744 E. Holt Blvd.
Ontario, CA 91761

California Polytechnic State University
Dr. Joseph Sabol, Associate Dean, School of Agriculture
San Luis Obispo, CA 93407

California Polytechnic State University
Dr. Joseph Hung
Agricultural Engineering Department Chairperson
3801 West Temple Ave.
Pomona, CA 91768-4006

California Polytechnic State University
Dr. Charles Stark, Professor Agricultural Engineering
3801 West Temple Ave.
Pomona, CA 91768-4006

Kubota Tractor
Mr. Tom Kane, National Training Director
550 W. Artesia
Compton, CA 90224

John Deere Company
Dave Rock, Southwest Regional Representative
10650 Harry Hines
P.O. Box 20598
Dallas, TX 75220

APPENDIX J

APPENDIX J

EQUIPMENT TECHNICIAN SURVEY

EQUIPMENT TECHNICIAN SURVEY

COMPANY:_____

OWNER:_____

STREET ADDRESS_____

CITY _____CA (ZIP)_____

CONTACT PERSON:_____PH# (___)_____

BUSINESS TYPE -- [] DEALER [] MUNICIPALITY
[] GOLF COURSE [] SCHOOL MAINTENANCE
[] CONTRACTOR [] UTILITY COMPANY
[] OTHER (please specify)_____

CHECK AS MANY AS APPLICABLE AND USE ADDITIONAL PAPER IF NECESSARY

1. Of the sub-fields listed below, which are closely related to your company?
   - [] Landscape Irrigation and Drainage
   - [] Residential Landscape Maintenance
   - [] Commercial Landscape Maintenance
   - [] Landscape Contractor
   - [] Building Contractor
   - [] Equipment Dealer
   - [] Equipment Rental
   - [] Equipment Repair
   - [] Park Maintenance
   - [] Excavation Contractor
   - [] Other (please specify)_____

2. Do you employ: (If so, how many full time/part time?)
   - [] Heavy Equipment Operators_____
   - [] Medium Equipment Operators_____
   - [] Small Equipment Operators (Landscape type equipment)_____
   - [] Heavy Equipment Mechanics_____
   - [] Medium Equipment Mechanics_____
   - [] Small Equipment Mechanics_____
   - [] Equipment Maintenance/Service_____

3. Would your company hire an equipment technician with:
   - [] A. a high school diploma
   - [] B. a certificate in equipment related field
   - [] C. a 2 year degree in equipment related field
   - [] D. a 4 year degree in equipment related field

4. In which of the categories in Question 3 do you find the most productive employee for your needs? [] A [] B [] C [] D
   Please explain_____
   _____
   _____

5. If you were to hire an equipment technician in 1987 what would be a typical starting salary?
   - [] Below $12,000
   - [] $12,000 - $16,000
   - [] $16,000 - $20,000
   - [] $20,000 - $24,000
   - [] Above $24,000

(over)



6. Would your company be interested in a training program for your current employees at Mt. San Antonio Community College? [] Y [] N

7. To upgrade your current employees would you prefer the program to be:
   - [] Day classes
   - [] Late afternoon classes
   - [] Night classes
   - [] Saturday classes
   - [] Other (please specify)_____
   - [] Degree (i.e. A.S.)
   - [] Certificate
   - [] Short term (3-9 wks)
   - [] Full term (18 wks)

8. What specific technical skills should an equipment technician have for your industry? Check as many as applicable.
   - [] Large tractor equipment operation
   - [] Medium tractor equipment operation
   - [] Light tractor equipment operation
   - [] Equipment electrical systems
   - [] Equipment drive trains
   - [] Equipment maintenance
   - [] Equipment trouble shooter
   - [] Irrigation repair/installation
   - [] Irrigation design
   - [] On-site work experience
   - [] Mowing operation
   - [] Lawn edging operation
   - [] Chain saw operation
   - [] Weed eater operations
   - [] Spraying equipment operation
   - [] Tillage operation
   - [] Safety
   - [] Power hand tools
   - [] Other (please specify)_____
   - [] Basic woodworking
   - [] Basic metalwork
   - [] Tool maintenance
   - [] Basic concrete
   - [] Basic plumbing
   - [] Basic surveying
   - [] Welding
   - [] Diesel engine repair
   - [] Gasoline engine repair
   - [] Small engine repair
   - [] Hydraulics
   - [] Pneumatics
   - [] Forklift operation
   - [] Backhoe operation
   - [] Skiploader/scraper
   - [] Bulldozer
   - [] Hand Tools

9. Would your company support an Equipment Technician Program through:
   - [] Equipment Donation
   - [] Equipment Loan
   - [] Promotion or Pay Raise for Graduates
   - [] Financial Assistance/Scholarship
   - [] Facilitating Work Experience
   - [] Other (please specify)_____

10. Would you or a representative from your company be willing to serve as a member on an equipment technician advisory committee at Mt. San Antonio Community College? [] Y [] N

Please add any additional comments which you feel will be helpful in considering the "Equipment Technician Program"_____

_____

_____

_____

_____

Please Return Survey to:

Mr. Tom Visosky
Mt. San Antonio Community College
1100 North Grand Avenue
Walnut, Ca 91789

THANK YOU FOR YOUR ASSISTANCE

APPENDIX K

APPENDIX K

SURVEY COVER LETTER

MT. SAN ANTONIO
COMMUNITY COLLEGE DISTRICT
1100 NORTH GRAND AVENUE • WALNUT, CALIFORNIA 91789
(714) 594-5611

April 20,1987

Dear President or Manager:

WE NEED YOUR HELP!

The Agricultural Department at Mt. San Antonio College is exploring the feasability of updating the existing Mechanized Agriculture Program to an Equipment Technology Program to better facilitate the needs of our urbanizing community. Enclosed is a Survey Form. We respectfully request that you complete and return the survey form as soon as possible so that we can incorporate your ideas into the Equipment Technology Program.

The current Mechanized Agricultural Program specializes in basic mechanical skill training, as well as operation, maintenance and repair of small to medium equipment used in agriculture. The revised program would maintain the theory and practice above, but relate it specifically to your industry needs.

The MSAC Agricultural Department wants to assist you in the training of your current and future employees! Thank you for your assistance. Please call me if you have any further comments or suggestions. (714) 594-5611 EXT. 540

Sincerely,

Tom Visosky
Agricultural Mechanics Instructor

Enclosure

APPENDIX L

APPENDIX L

SURVEY SAMPLE POPULATION

A & J UNLIMITED
5331 HAMMILL RD.
EL MONTE, CA 91731

A A EQUIPMENT RENTALS
10611 RAMONA
MONTCLAIR, CA 91763

A RENTALAND
707 N. BREA BLVD.
BREA, CA 92621

A W BAKER
1820 WALNUT
LA VERNE, CA 91750

A-1 ASPHALT & SEALCOAT
5017 BLEECKER
BALDWIN PARK, CA 91706

A-1 EQUIPMENT RENTALS
19034 E. ARROW HWY.
COVINA, CA 91724

*A-1 LOU'S RENTAL
8642 E. BEVERLY
PICO RIVERA, CA 90660

A-1 LOU'S RENTAL
5828 MISSION
RIVERSIDE, CA 92507

A-1 LOU'S RENTAL
1040 PRICE
POMONA, CA 91766

AARMCO
840 N. RADWAY AVENUE
LA PUENTE, CA 91746

ABBEY RENTS
704 N. AZUSA AVENUE
WEST COVINA, CA 91790

*ABLE EQUIPMENT RENTAL
13401 E. ROSECRANS
SANTA FE SPRINGS, CA 90670

ACE RENTAL
1035 N. CITRUS
COVINA, CA 91722

ACTION RENTALS
1822 S. LEWIS
ANAHEIM, CA 92805

ADCO EQUIPMENT
15633 E. TEMPLE
LA PUENTE, CA 91744

ADVANCED LANDSCAPE
838 ALESSANDRO
LA VERNE, CA 91750

ALBIN'S BACKHOE SERVICE
18436 SECTION CENTER
COVINA, CA 91722

ALFREDO'S EXCAVATING & PAVING
437 N. DURRELL AVENUE
AZUSA, CA 91702

ALL CITIES RENTAL CENTER
2610 N. GAREY
POMONA, CA 91766

*ALL FORKLIFT REPAIR & SERVICE
236 ARROW HWY.
COVINA, CA 91722

*ALOHA LANDSCAPE
328 W. BAINBRIDGE
WEST COVINA, CA 91790

ALPINE LANDSCAPE SERVICES
813 FORDLAND AVENUE
LA VERNE, CA 91750

*RESPONDENT

*ALTA DENA DAIRY
17637 E. VALLEY BLVD.
INDUSTRY, CA 91747

AMERICAN HI-LIFT CO.
2335 CHERRY INDUSTRY CIRCLE
LONG BEACH, CA 90801

AMERICAN LANDSCAPING
8626 ARROW ROUTE
CUCAMONGA, CA 91730

AMERICAN RENTAL CENTER
17319 E. VALLEY
INDUSTRY, CA 91744

APOLLO COMPRESSOR
15457 E. PROCTOR
INDUSTRY, CA 91744

ARCADIA PAR 3 GOLF COURSE
620 E. LIVE OAK
ARCADIA, CA 91006

ARROW EQUIPMENT RENTAL
15042 E. ARROW
BALDWIN PARK, CA 91706

ARROW EQUIPMENT RENTAL
1920 W. HOLT
POMONA, CA 91766

ARROW EQUIPMENT RENTAL
1176 E. HOLT
ONTARIO, CA 91764

ARTISTIC LANDSCAPE, INC.
195 N. EUCLID AVENUE
UPLAND, CA 91786

ARTISTIC MAINTENANCE
14947 SIERRA BONITA LANE
CHINO, CA 91710

A T & T COMPANY
201 E. SANDPOINTE
SANTA ANA, CA 92701

ATLAS ASPHALT
13942 E. VALLEY
LA PUENTE, CA 91746

ATRA ASPHALT PAVING CO.
10773 CENTRAL PLACE
ONTARIO, CA 91764

AZUSA GREENS COUNTRY CLUB
919 W. SIERRA MADRE AVE.
AZUSA, CA 91702

AZUSA UNIFIED SCHOOL
DISTRICT
AZUSA, CA 91702

AZUSA VALLEY WATER COMPANY
617 N. AZUSA
AZUSA, CA 91702

B & M ASPHALT
1250 N. DALTON AVENUE
AZUSA, CA 91702

B HILL EXCAVATING
4971 WEBB CANYON RD.
CLAREMONT, CA 91711

B M H, INC.
19135 E. SAN JOSE AVENUE
ROWLAND HEIGHTS, CA 91748

B & P ASPHALT PAVING
& SEALING
5060 GAYHURST AVENUE
BALDWIN PARK, CA 91706

*BALDWIN PARK UNIFIED
SCHOOL DISTRICT
3699 HOLLY AVENUE
BALDWIN PARK, CA 91706

BASSET UNIFIED SCHOOL DIST.
904 N. WILLOW AVENUE
EL MONTE, CA 91733

BASSETDALE PAVING
14914 E. VALLEY BLVD.
LA PUENTE, CA 91746

BELLEVUE CEMETERY
1240 WEST G. STREET
ONTARIO, CA 91764

BEN'S LAWNMOWER SERVICE
731 E. ARROW HWY.
GLENDORA, CA 91740

*RESPONDENT

BENGAL TRACTOR, INC.
1852 POMONA RD.
CORONA, CA 91720

BEST GOLF CARS
15622-A VALLEY BLVD.
FONTANA, CA 92335

BIG M ASPHALT PAVING
5558 N. APPLECROSS AVENUE
AZUSA, CA 91702

B.L.M. & ASSOCIATES
EQUIPMENT RENTALS
724 N. BARRANCA
COVINA, CA 91722

BOB BROWN BACKHOE SERVICE
7929 SELMA AVENUE
RANCHO CUCAMONGA, CA 91730

BOB KATZ SALES & SERVICE
221 W. COMMERCIAL
SAN DIMAS, CA 91773

*BOB'S GARDEN MACHINERY
9933 VALLEY
EL MONTE, CA 91732

BOB'S LANDSCAPE DESIGN
4221 JERRY AVENUE
BALDWIN PARK, CA 91706

*BROMAGE'S GARDENING SERVICE
495 E. 19TH STREET
UPLAND, CA 91786

BURKE'S NURSERY
CUSTOM LANDSCAPING
1207 N. SUNFLOWER AVENUE
COVINA, CA 91723

*BUSY BEE LANDSCAPE SERVICES
12512 E. EVARO DRIVE
WHITTIER, CA 90601

C & F LANDSCAPING
12659 OAKS AVENUE
CHINO, CA 91710

C & G RENTS
344 W. BONITA
SAN DIMAS, CA 91773

CA. EXCAVATING, GRADING
& DEMOLITION
527 BREA CANYON RD.

CAL REAL CONSTRUCTION
12953 GARVEY AVENUE
BALDWIN PARK, CA 91706

CALIF. SPRINKLER REPAIR
2664 POMONA BLVD.
POMONA, CA 91766

CALIFORNIA COUNTRY CLUB
1509 S. WORKMAN ROAD
WHITTIER, CA 90604

*CALTRANS -MAINTENANCE DEPT.
21420 GOLDEN SPRINGS DR.
WALNUT, CA 91789

CAPITOL TRENCHER CORP.
155 N. EUCLA
SAN DIMAS, CA 91773

CARDONA PAVING
3716 ESTO AVENUE
EL MONTE, CA 91732

CARTER SANITATION
4266 ELTON
BALDWIN PARK, CA 91706

CASE POWER & EQUIPMENT
14841 E. DON JULIAN ROAD
INDUSTRY, CA 91744

C D PAVING & SEALING
P. O. BOX 1451
GLENDORA, CA 91740

CENTRAL MOWER SERVICE
12066 CENTRAL AVENUE
CHINO, CA 91710

*RESPONDENT

CENTRAL STONE
721 E. ARROW HWY.
AZUSA, CA 91702

CERTIFIED LIFT TRUCK
10226 S. GREENLEAF
SANTA FE SPRINGS, CA 90670

CERTIFIED SEWER SERVICE
436 S. JACKSON AVENUE
AZUSA, CA 91702

CHALLENGE-COOK BROS.
15241 E. GALE
INDUSTRY, CA 91744

*CHARTER OAK
UNIFIED SCHOOL DISTRICT
20240 E. CIENEGA
COVINA, CA 91723

CHINO CENTRAL RENTALS
13644 CENTRAL AVENUE
CHINO, CA 91710

*CHINO UNIFIED SCHOOL DIST.
5130 RIVERSIDE DR.
CHINO, CA 91710

*CHINO WELDING & ASSEMBLY
16379 CHINO CORONA ROAD
CHINO, CA 91710

CITY LANDSCAPE CO.
20709 COLIMA ROAD
WALNUT, CA 91789

CITY OF ALHAMBRA
PUBLIC WORKS DEPT.
111 S. 1ST STREET

CITY OF ARCADIA
PUBLIC WORKS DEPT.
240 HUNTINGTON DRIVE
ARCADIA, CA 91006

CITY OF ARCADIA
RECREATION DEPT.
240 W. HUNTINGTON DRIVE
ARCADIA, CA 91006

CITY OF AZUSA
LIGHT & WATER DEPT.
213 E. FOOTHILL BLVD.
AZUSA, CA 91702

CITY OF AZUSA
RECREATION DEPT.
320 N. ORANGE AVENUE
AZUSA, CA 91702

*CITY OF CHINO
STREET MAINTENANCE
5050 SCHAEFER
CHINO, CA 91710

CITY OF CLAREMONT
PUBLIC WORKS DEPARTMENT
207 HARVARD AVENUE
CLAREMONT, CA 91711

CITY OF COMMERCE
PUBLIC WORKS DEPT.
2535 COMMERCE WAY
COMMERCE, CA

*CITY OF COMMERCE
PARKS & RECREATION DEPT.
2535 COMMERCE WAY
COMMERCE, CA

*CITY OF COVINA
PUBLIC WORKS DEPT.
125 E. COLLEGE
COVINA, CA 91723

*CITY OF COVINA
WATER DIVISION
125 E. COLLEGE
COVINA, CA 91723

CITY OF DUARTE
MAINTENANCE DEPT.
1600 HUNTINGTON DRIVE
DUARTE, CA 91010

CITY OF DUARTE
PARKS & RECREATION DEPT.
1600 HUNTINGTON DRIVE
DUARTE, CA 91010

*RESPONDENT

CITY OF EL MONTE
PUBLIC WORKS DEPT.
11337 VALLEY BLVD.
EL MONTE, CA 91732

CITY OF GLENDORA
PARKS & RECREATION DEPT.
116 E. FOOTHILL BLVD.
GLENDORA, CA 91740

CITY OF GLENDORA
PUBLIC WORKS DEPT.
116 E. FOOTHILL BLVD.
GLENDORA, CA 91740

CITY OF INDUSTRY
WATERWORKS SYSTEM
15825 E. MAIN
LA PUENTE, CA 91746

CITY OF LA HABRA
MAINTENANCE DEPT.
201 E. LA HABRA BLVD.
LA HABRA, CA 90631

*CITY OF LA MIRADA
MAINTENANCE DEPT.
13700 S. LA MIRADA BLVD.
LA MIRADA, CA 90638

CITY OF LA PUENTE
MAINTENANCE DEPT.
15900 E. MAIN
LA PUENTE, CA 91746

CITY OF LA VERNE
PARKS & RECREATION DEPT.
3060 D STREET
LA VERNE, CA 91750

*CITY OF LA VERNE
PUBLIC WORKS DEPT.
3660 D STREET
LA VERNE, CA 91750

CITY OF MONROVIA
MAINTENANCE DEPT.
415 S. IVY AVENUE
MONROVIA, CA 91016

CITY OF MONTCLAIR
PUBLIC WORKS DEPT.
5111 BENITO
MONTCLAIR, CA 91763

CITY OF MONTEREY PARK
MAINTENANCE DEPT.
320 W. NEWMARK AVENUE
MONTEREY PARK, CA 91754

CITY OF ONTARIO
PUBLIC SERVICES DEPT.
1425 S. BON VIEW
ONTARIO, CA 91764

CITY OF PASADENA
WATER & POWER DEPT.
100 N. GARFIELD AVENUE
PASADENA, CA 91105

CITY OF PICO RIVERA
MAINTENANCE DEPT.
6615 S. PASSONS BLVD.
PICO RIVERA, CA 90660

CITY OF POMONA
PARKS & RECREATION DEPT.
499 E. ARROW HWY.
POMONA, CA 91767

CITY OF POMONA
WATER DEPT.
505 S. GAREY AVENUE
POMONA, CA 91766

CITY OF RANCHO CUCAMONGA
PUBLIC WORKS DEPT.
9320 BASELINE ROAD
RANCHO CUCAMONGA, CA 91730

CITY OF SAN DIMAS
PARKS & RECREATION DEPT.
245 BONITA AVENUE
SAN DIMAS, CA 91773

CITY OF SAN DIMAS
PUBLIC WORKS DEPT.
245 BONITA AVENUE
SAN DIMAS, CA 91773

*RESPONDENT

CITY OF SAN GABRIEL
PUBLIC WORKS DEPT.
532 MISSION DRIVE
SAN GABRIEL, CA 91776

CITY OF SAN MARINO
MAINTENANCE DEPT.
2200 HUNTINGTON DRIVE
SAN MARINO, CA 91108

CITY OF SANTA FE SPRINGS
MAINTENANCE DEPT.
11710 E. TELEGRAPH
SANTA FE SPRINGS, CA 90670

*CITY OF SOUTH EL MONTE
PUBLIC WORKS DEPT.
1415 SANTA ANITA AVENUE
SOUTH EL MONTE, CA 91733

CITY OF SOUTH PASADENA
MAINTENANCE DEPT.
1414 MISSION
SOUTH PASADENA, CA 91030

CITY OF TEMPLE CITY
MAINTENANCE DEPT.
9701 LAS TUNAS DRIVE
TEMPLE CITY, CA 91780

CITY OF UPLAND
PUBLIC WORKS DEPT.
460 N. EUCLID
UPLAND, CA 91786

*CITY OF WALNUT
LANDSCAPE MAINTENANCE
21201 LA PUENTE ROAD
WALNUT, CA 91789

*CITY OF WEST COVINA
MAINTENANCE DEPT.
1444 W. GARVEY AVE. SOUTH
WEST COVINA, CA 91791

CITY OF WHITTIER
MAINTENANCE DEPT.
13230 E. PENN
WHITTIER, CA 90602

CLAREMONT GOLF COURSE
1550 N. INDIAN HILL BLVD.
CLAREMONT, CA 91711

CLAREMONT UNIF. SCHOOL
DIST.
2080 N. MOUNTAIN
CLAREMONT, CA 91711

CLARKLIFT OF LOS ANGELES, INC.
8314 E. SLAUSON AVENUE
PICO RIVERA, CA 90660

CLASSIC LANDSCAPE DESIGN
& SERVICES
12175 RAMONA AVENUE
CHINO, CA 91710

COLIMAN LAND CLEARING CORP.
545 S. STANFORD
LOS ANGELES, CA 90040

COOK TERRY A LANDSCAPING
1008 W. STEELE DRIVE
BREA, CA 92621

COUNTRY HILLS NURSERY
19309 E. COLIMA ROAD
ROWLAND HEIGHTS, CA 91748

COURTNEY LANDSCAPE MAINT.
12363 YORBA AVENUE
CHINO, CA 91710

COVINA IRRIGATING COMPANY
146 COLLEGE
COVINA, CA 91722

COVINA RENT-ALL
457 E. SAN BERNARDINO RD.
COVINA, CA 91723

*COVINA VALLEY
519 E. BADILLO
COVINA, CA 91722

*C R COOK FORD TRACTORS,
INC.
14550 GARVEY AVENUE.
BALDWIN PARK, CA 91706

*RESPONDENT

CRESTHILL DEVELOPMENT, INC.
300 HOOPER STREET
WEST COVINA, CA 91791

CROWN LIFT TRUCKS
1360 DARIUS CT.
INDUSTRY, CA 91744

CUSHING TRACTOR, INC.
5130 BALDWIN PARK AVE.
TEMPLE CITY, CA 91780

D & R RENTAL
431 W. CHESTNUT AVENUE
MONROVIA, CA 91016

DAN'S LAWNMOWER SERVICE
662 W. RIALTO AVENUE
RIALTO, CA 92376

DEMAY EQUIPMENT & SUPPLY
1325 BIXBY DRIVE
INDUSTRY, CA 91744

DIAMOND BAR GOLF
22751 GOLDEN SPRINGS DR.
DIAMOND BAR, CA 91765

DICK'S BACKHOE SERVICE
1711 W. SWANEE LANE
WEST COVINA, CA 91791

DITCH-WITCH OF LA-ORANGE
11771 MARKON ROAD
GARDEN GROVE, CA 92641

*D L S GRADING
131 3RD AVENUE
COVINA, CA 91722

*DUNN & COMPANY
470 W. COMMERCIAL
POMONA, CA 91766

D V PORTER, INC.
122 S. 4TH AVENUE
LA PUENTE, CA 91744

E & R CONSTRUCTION
945 WELLINTON ROAD
SAN DIMAS, CA 91773

E G PIPER
14100 E. VALLEY
INDUSTRY, CA 91745

E R BAKER
419 W. NORTHRIDGE AVENUE
GLENDORA, CA 91740

E-Z RENTALS
4168 HOLT
MONTCLAIR, CA 91763

*EBERHARD EQUIPMENT
2506 S. HARBOR BLVD.
SANTA ANA, CA 92704

ECKARDT SKIP SERVICE, INC.
530 N. WABASH
GLENDORA, CA 91740

ED ANGLEMYER & SONS
320 S. IRWINDALE
AZUSA, CA 91702

EDREY COMPANY
P. O. BOX 1428
BALDWIN PARK, CA 91706

EDWARD'S BACKHOE SERVICE
1643 E. IDAHOME
WEST COVINA, CA 91791

EDWARD'S CONSTRUCTION CO.
1141 W. KINGSIDE
COVINA, CA 91722

EL MONTE RENTS
12061 VALLEY BLVD.
EL MONTE, CA 91733

EL PRADO GOLF COURSE
6555 PINE AVENUE
CHINO, CA 91710

ENGINE & EQUIPMENT CO.
275 W. ALLEN AVENUE
SAN DIMAS, CA 91773

EQUIPMENT CENTER
23261 NANDINA AVENUE
PERRIS, CA 92370

*RESPONDENT

EQUIPMENT RENT CO.
82 LAS TUNAS DR.
ARCADIA, CA 91006

EVANS LAWN MOWERS
436 W. MONTEREY AVE.
POMONA, CA 91766

FOOTHILL LAWM MOWER SERVICE
8133 FOOTHILL BLVD.
CUCAMONGA, CA 91730

*FOREST LAWN
21300 E. VIA VERDE
COVINA, CA 91722

FOUNDATION EXCAVATION
2160 E. CENTRAL AVE.
DUARTE, CA 91010

FREEBORN EQUIPMENT CO.
7607 S. INDUSTRY AVENUE
PICO RIVERA, CA 90660

FREEBORN EQUIPMENT CO.
1240 S. WRIGHT
SANTA ANA, CA 92704

FREEBORN EQUIPMENT CO.
735 W. RIALTO AVENUE
RIALTO, CA 92376

*GERLACK LANDSCAPE
COVINA, CA 91791

GENERAL TELEPHONE CO.
1023 N. AZUSA AVENUE
COVINA, CA 91722

GLEN OAKS GOLF
200 W. DAWSON
GLENDORA, CA 91740

GLENDORA COUNTRY CLUB
310 S. AMELIA
GLENDORA, CA 91740

GLENDORA RENTALS
1405 E. ALOSTA
GLENDORA, CA 91740

GLENN & KING
AUTOMOTIVE SERVICE
4721-C ARROW HWY.
MONTCLAIR, CA 91763

*GLENN B. DORNING, INC.
1744 HOLT BLVD.
ONTARIO, CA 91761

GOLDEN COAST LANDSCAPE
MAINT.
219 PIEDMONT AVENUE
CLAREMONT, CA 91711

*GREEN GARDENS
PROFESSIONAL LANDSCAPE
13386 YORBA AVENUE
CHINO, CA 91710

GREEN TREE NURSERY
20627 E. COLIMA ROAD
WALNUT, CA 91789

GUARANTEED PRODUCTS
355 N. VINELAND
INDUSTRY, CA 91744

GUNITE SUPPLY & EQUIPMENT
1726 S. MAGNOLIA
MONROVIA, CA 91016

H & H LAWN MOWERS
563 W. HOLT BLVD.
ONTARIO, CA 91764

HACIENDA/LA PUENTE
SCHOOL DISTRICT
16949 E. WEDGEWORTH DRIVE
HACIENDA HEIGHTS, CA 91745

HACIENDA LAWN MOWER SHOP
1130 N. HACIENDA BLVD.
LA PUENTE, CA 91748

HALSTEAD CONSTRUCTION
SUPPLIES
2200 VALLEY
POMONA, CA 91768

*RESPONDENT

HAMILTON'S LAWNMOWER SERVICE
722 N. AZUSA AVENUE
AZUSA, CA 91702

HARDEN'S LAWN MOWER
SALES & SERVICE
569 E. SAN BERNARDINO ROAD
COVINA, CA 91722

HARRIS CONVEYOR & RENTALS
2450 N. ROSEMEAD
SOUTH EL MONTE, CA 91733

HARRY BOULCH REPAIRS
358 S. MOTOR AVENUE
AZUSA, CA 91702

HEAVY EQUIPMENT RENTAL
137 S. HACIENDA
GLENDORA, CA 91740

HEAVY EQUIPMENT RENTAL
2420 1ST STREET
LA VERNE, CA 91750

HERTZ EQUIPMENT
RENTAL CORPORATION
21600 S. VERNON AVE.
TORRENCE, CA 90501

HICKOK EQUIPMENT COMPANY
14203 CLOVERSIDE
BALDWIN PARK, CA 91706

HISEY RENTALS
3869 W. VALLEY
WALNUT, CA 91789

HOLY CROSS CEMETERY
444 E. LEXINGTON AVENUE
POMONA, CA 91766

HOVIS BACKHOE WORK
12212 CORLEY DRIVE
WHITTIER, CA 90604

*HOWARD MEES
ENVIRONMENTAL CARE
8500 MIRAMAR PLACE
SAN DIEGO, CA 92121

HOWARD'S LIFT TRUCK, INC.
10435 MILLS AVENUE
MONTCLAIR, CA 91763

*INDUSTRIAL EQUIPMENT
RENTALS
822 S. NOGALES
INDUSTRY, CA 91744

INDUSTRIAL MACHINE &
MANUFACTURING CO.
2626 SEAMAN AVENUE
EL MONTE, CA 91732

INDUSTRY HILLS MAINT. DEPT.
1 INDUSTRY HILLS PARKWAY
INDUSTRY, CA 91744

INDUSTRY LIFT, INC.
822 S. NOGALES
INDUSTRY, CA 91744

INGERSOLL RAND EQUIPMENT
5211 PARAMOUNT
PICO RIVERA, CA 90660

INTERNATIONAL FORKLIFT CO.
7930 S. PARAMOUNT BLVD.
PICO RIVERA, CA 90660

IRWINDALE - MAINT. DEPT.
5050 N. IRWINDALE AVE.
IRWINDALE, CA 91706

ISLAS DEMOLITION
16166 E. ARROW HWY.
IRWINDALE, CA 91706

J & J RENTAL
13628 E. VALLEY
LA PUENTE, CA 91745

*J & R LANDSCAPE MAINT.
10964 ROSEWELL AVE.
POMONA, CA 91767

J M K PALLET JACK REPAIR
942 WELLINGTON ROAD
SAN DIMAS, CA 91773

*RESPONDENT

JACK PALO EQUIPMENT CO.
1000 W. FOOTHILL
AZUSA, CA 91702

JACK RHODES CO., INC.
15947 KAPLAN DRIVE
INDUSTRY, CA 91744

JACK'S LAWNMOWER SERVICE
13043 FRANCISQUITO AVE.
BALDWIN PARK, CA 91706

JAGUR TRACTOR
EQUIPMENT RENTAL
P. O. BOX 5007
HACIENDA HEIGHTS, CA 91745

JAY'S BACKHOE SERVICE
4225 ELTON
BALDWIN PARK, CA 91706

*JOHN DEERE CO.
DAVID D. ROCK
8301 TAMARIND LANE
RIVERSIDE, CA 92509

JOHN'S BACKHOE SERVICE
P. O. BOX 727
BALDWIN PARK, CA 91706

JOHNSON TRACTOR COMPANY
800 E. LA CADENA DRIVE
RIVERSIDE, CA 92507

KAY'S OPERATED EQUIPMENT
1374 E. 9TH
POMONA, CA 91766

KEITH'S BACKHOE
2730 W. DALEPARK DR.
SAN DIMAS, CA 91773

*KUBOTA TRACTOR CORP.
TOM KANE
550 WEST ARTESIA BLVD.
COMPTON, CA 90220

L BARRIOS & ASSOCIATES
4900 AZUSA CANYON RD.
IRWINDALE, CA 91705

LA PUENTE FORKLIFT SERVICE
13942 E. VALLEY
LA PUENTE, CA 91745

LA PUENTE VALLEY
COUNTY WATER DISTRICT
15825 E. MAIN
LA PUENTE, CA 91746

LACKEY EQUIPMENT RENTAL
953 N. 2ND AVENUE
UPLAND, CA 91786

LAIRD CONSTRUCTION
9460 LUCAS RANCHO RD.
RANCHO CUCAMONGA, CA 91701

*L D M PIPELINE, INC.
5148 BLEECKER
BALDWIN PARK, CA 91706

L E BARD & UNDERWOOD
321 E. IMPERIAL
LA HABRA, CA 90631

LEE & STIRE, INC.
634 S. PALMETTO
ONTARIO, CA 91764

LEWIS SAW AND LAWNMOWER
734 N. AZUSA AVENUE
AZUSA, CA 91702

*LEWIS CHAINSAW & LAWNMOWER
734 N. AZUSA
AZUSA, CA 91702

LOHRKE FORKLIFT SERVICE
3755 HALINER LANE
BALDWIN PARK, CA 91706

LONG'S PAVING & REPAIRS
P. O. BOX 2102
IRWINDALE, CA 91706

LORWILL SEALCOATING
904 E. HALTRAN
AZUSA, CA 91702

*RESPONDENT

LOS ANGELES COUNTY
PUBLIC WORKS
14747 RAMONA BLVD.
BALDWIN PARK, CA 91706

LOS ANGELES ROYAL VISTA
GOLF COURSE
20055 COLIMA ROAD
WALNUT, CA 91789

LOS SERRANOS GOLF
& COUNTRY CLUB
15656 YORBA AVENUE
CHINO, CA 91710

L S HAWLEY CORPORATION
5277 N. VINCENT AVENUE
IRWINDALE, CA 91706

L V J LEASING, INC.
13347 E. TEMPLE AVENUE
LA PUENTE, CA 91746

M & J PALLET COMPANY
12152 EAST END AVENUE
CHINO, CA 91710

MACHINING, ETC.
5009 ARROW HWY.
MONTCLAIR, CA 91763

MARCHAND'S EQUIPMENT
RENTALS
440 N. AZUSA
AZUSA, CA 91702

MARSAN TURF &
IRRIGATION SUPPLY, INC.
131 E. ARROW HWY.
SAN DIMAS, CA 91773

MARSHALL CANYON COUNTRY
CLUB
6100 STEPHENS RANCH ROAD
LA VERNE, CA 91750

MARUNNAKA LAWNMOWER SHOP
4544 N. GRAND AVENUE
COVINA, CA 91722

M D F DEMOLITION
134 S. KENDLE WAY
WEST COVINA, CA 91791

*MEMORY GARDEN MEMORIAL PARK
455 W. CENTRAL
BREA, CA 92621

MENDOZA PAVING
11574 E. PERKINS
WHITTIER, CA 90604

MESA CONSTRUCTION EQUIPMENT
1726 S. MAGNOLIA
MONROVIA, CA 91016

*METROPOLITAN WATER DISTRICT
OF SOUTHERN CALIFORNIA
P. O. BOX 54153
LOS ANGELES, CA 90054

MONTE VISTA WATER DIST.
P. O. BOX 71
MONTCLAIR, CA 91763

MONTEBELLO GOLF COURSE
901 VIA SAN CLEMENTE
MONTEBELLO, CA 90640

MARIO'S LAWNMOWER SHOP
14828 RAMONA BLVD.
BALDWIN PARK, CA 91706

MUSTANG EQUIPMENT CO.
2425 S. KELLA AVE.
INDUSTRY, CA 91744

OAK PARK CEMETERY
410 SYCAMORE AVENUE
CLAREMONT, CA 91711

OAKDALE
1401 S. GRAND AVENUE
GLENDORA, CA 91740

*RESPONDENT

*PACIFIC EQUIPMENT
& IRRIGATION
19515 WALNUT DRIVE NORTH
INDUSTRY, CA 91744

PAT'S FORKLIFT
14439-C JOANBRIDGE
BALDWIN PARK, CA 91706

PATTON SALES CORPORATION
558 E. CALIFORNIA
ONTARIO, CA 91761

PAUL'S EQUIPMENT RENTALS
3914 DOWNING AVENUE
BALDWIN PARK, CA 91706

POMONA CEMETERY
502 E. FRANKLIN AVENUE
POMONA, CA 9L766

POMONA IRRIGATION
8444 LIMONITE AVENUE
RIVERSIDE, CA 92501

POMONA UNIFIED SCHOOL DIST.
800 S. GAREY AVENUE
POMONA, CA 91766

PORTER & STANLEY
13860 E. VALLEY
LA PUENTE, CA 91746

PRECISION PIPELINE, INC.
457 WEST ALLEN
SAN DIMAS, CA 91773

PRESTSATER CONSTRUCTION
2420 1ST STREET
LA VERNE, CA 91750

R B M MANUFACTURING CO.
1619 POTRERO AVENUE
SOUTH EL MONTE, CA 91733

R L L COMPANY
1212 W. 58TH STREET
LOS ANGELES, CA 90022

R & B BACKHOE &
DUMP TRUCK SERVICE
1841 JOAN COURT
WEST COVINA, CA 91791

RALPH'S GARDEN EQUIPMENT
13541 E. WHITTIER BLVD.
WHITTIER, CA 90604

RANCHO DUARTE GOLF COURSE
1000 LAS LOMAS ROAD
DUARTE, CA 91010

RAPID MFG. COMPANY
14266-A EAST VALLEY BLVD.
LA PUENTE, CA 91748

REXNORD, INC.
14160 LIVE OAK AVENUE
BALDWIN PARK, CA 91706

RICE HONDA
10005 E. GARVEY AVENUE
EL MONTE, CA 91732

RICHARD O'BRIEN
EQUIPMENT SALES
3602 SEQUOIA CIRCLE
WEST COVINA, CA 91792

ROBSON COMPANY, INC.
13037 E. LAKELAND
SANTA FE SPRINGS, CA 90670

RON BROWN EXCAVATING
1256 N. CITRUS
COVINA, CA 91722

ROSE HILLS MEMORIAL PARK
3900 S. WORKMAN MILL ROAD
WHITTIER, CA 90604

*ROWLAND UNIFIED SCHOOL DIST.
1830 S. NOGALES
ROWLAND HEIGHTS, CA 91748

ROWLAND WATER DISTRICT
3021 S. FULLERTON RD.
ROWLAND HEIGHTS, CA 91748

*RESPONDENT

R T LARSEN, INC.
150 E. POMONA AVENUE
MONROVIA, CA 91016

S & J PARTS & SERVICE
429 S. PALMETTO
ONTARIO, CA 91761

S & E PIPELINE
CONSTRUCTION COMPANY
11832 S. BLOOMFIELD AVENUE
SANTA FE SPRINGS, CA 90670

*SAM, INC.
161 MERCURY CIRCLE
POMONA, CA 91766

SAM'S TRACTOR ENTERPRISE
P. O. BOX 623
GLENDORA, CA 91740

SAN BON CONSTRUCTORS
1025 OAK CANYON LANE
GLENDORA, CA 91740

SAN BON CONTRACTORS
910 W. GLADSTONE
SAN DIMAS, CA 91773

SAN DIMAS CANYON
COUNTRY CLUB
2100 TERREBONNE AVENUE
SAN DIMAS, CA 91773

SAN GABRIEL VALLEY WATER CO.
14404 E. VALLEY BLVD.
INDUSTRY, CA 91744

SASSEN SEWERS
331 S. ASPAN AVENUE
AZUSA, CA 91702

SHAMROCK SALES & SERVICE
9711 RUSH
SOUTH EL MONTE, CA 91733

SHEPHERD MACHINERY COMPANY
ROSE HILL ROAD
INDUSTRY, CA 91744

SIERRA LA VERNE COUNTRY CLUB
6300 COUNTRY CLUB DRIVE
LA VERNE, CA 91750

*SIMON EQUIPMENT RENTALS
202 W. HUNTINGTON DR.
MONROVIA, CA 91016

SOUTH HILLS COUNTRY CLUB
2655 E. CITRUS
WEST COVINA, CA 91791

SOUTH WEST WATER COMPANY
16340 E. MAPLEGROVE
LA PUENTE, CA 91746

SOUTHERN CALIF. EDISON
P. O. BOX 600
ROSEMEAD, CA 91771

SOUTHERN CALIF. GAS CO.
MAINTENANCE DEPT.
P. O. BOX 653
MONTEREY PARK, CA 91754

SOUTHERN CALIFORNIA WATER CO.
121 N. EXCHANGE PLACE
SAN DIMAS, CA 91773

*SOUTHLAND EQUIPMENT SALES
10637 E. MIDWAY
CERRITOS, CA

S S P CONSTRUCTIN EQUIPMENT CO.
1100 E. 2ND STREET
POMONA, CA 91766

STAGGS TRACTOR WORK
709 E. ALOSTA
GLENDORA, CA 91740

*STEVE'S ALL AMERICAN
1447 RANGER DR.
COVINA, CA 91722

STEVE BALL
GOLF COURSE SUPERINTENDENT
6379 JAMELESON AVE.
RESEDA, CA 91335

*RESPONDENT

STEVENS' FOOTHILL RENTALS
1690 W. FOOTHILL
UPLAND, CA 91786

STEVENS' FOOTHILL RENTALS
7070 ARCHIBALD
ALTA LOMA, CA 91701

*SUBURBAN WATER SYSTEMS
16340 MAPLEGROVE
LA PUENTE, CA 91746

SUNSHINE GROWERS
20659 VALLEY BLVD.
WALNUT, CA 91789

TADCO
302 BRADBURY ROAD
BRADBURY, CA 91010

TARGET EQUIPMENT RENTALS
704 W.MISSION
POMONA, CA 91766

*TAYLOR RENTAL CENTER
708 W. ARROW
SAN DIMAS, CA 91773

*TELELECT WEST
14340 E. ARROW
BALDWIN PARK, CA 91706

THE CART MAN, INC.
1330 GLASELL
ORANGE, CA 92668

THE HOSE MAN
5397 N. IRWINDALE
IRWINDALE, CA 91706

T M WRECKING
& EXCAVATING
16221 E. DENTLEY
HACIENDA HEIGHTS, CA 91745

TOM VOSS TRACK SERVICE
5869 EQUESTRIAN CT.
CHINO, CA 91710

TOM'S SAW AND LAWNMOWER SHOP
915 N. ORANGE AVENUE
LA PUENTE, CA 91748

TORGRMSON GARDENING &
LANDSCAPING
1504 VIA CORONA
LA VERNE, CA 91750

TOYOTA INDUSTRIAL
EQUIPMENT DIR.
7606 S. INDUSTRY AVENUE
PICO RIVERA, CA 90660

TROPICAL IRRIGATION CO.
5655 CHINO AVENUE
CHINO, CA 91710

TURNER LANDSCAPE DESIGN
2575 POMONA BLVD.
POMONA, CA 91766

*TURNERS, INC.
5072 W. MISSION
ONTARIO, CA 91762

*U-HAUL CENTER OF BALDWIN PARK
1889 PUENTE AVENUE
BALDWIN PARK, CA 91706

U-HAUL CENTER OF CHARTER
OAK
1961 E. COVINA BLVD.
COVINA, CA 91724

U-HAUL CENTER OF COVINA
1335 N. AZUSA
COVINA, CA 91724

U-HAUL COMPANY
2190 N. GAREY
POMONA, CA 91766

UNITED ASPHALT COMPANY, INC.
14660 INDUSTRY CIRCLE
LA MIRADA, CA 90638

UNITED RENT-ALL
555 S. GLENDORA
WEST COVINA, CA 91790

*RESPONDENT

U S RENTALS
10625 MONTE VISTA
MONTCLAIR, CA 91763

*VALENCIA HEIGHTS WATER CO.
3009 VIRGINIA AVENUE
WEST COVINA, CA 91791

VALINDA ASPHALT
131 S. 6TH STREET
INDUSTRY, CA 91744

VALLEY BACKHOE AND
EXCAVATING, INC.
2705 SIERRA WAY
LA VERNE, CA 91750

VALLEY COUNTY WATER DISTRICT
14521 RAMONA BLVD.
BALDWIN PARK, CA 91706

VALLEY VIEW
MUTUAL WATER COMPANY
13730 LOS ANGELES
BALDWIN PARK, CA 91706

VERNON ASPHALT MATERIAL CO.
2600 BUENA VISTA ROAD
IRWINDALE, CA 91706

VIA VERDE COUNTRY CLUB
1400 AVENIDA
SAN DIMAS, CA 91773

VIENNA NURSERY
359 E. GLADSTONE
AZUSA, CA 91702

W K EQUIPMENT CO.
1380 E. 5TH STREET
ONTARIO, CA 91764

*WALNUT VALLEY WATER DISTRICT
271 S. BREA CANYON RD.
WALNUT, CA 91789

WAREHOUSE EQUIPMENT
ERECTORS
1631 S. DOVERFIELD AVENUE
HACIENDA HEIGHTS, CA 91745

WEST COVINA
UNIFIED SCHOOL DISTRICT
1717 W. MERCED AVENUE
WEST COVINA, CA 91791

WESTERN HILLS
GOLF & COUNTRY CLUB
CARBON CANYON RD.
CHINO, CA 91710

WESTERN LANDSCAPE
726 E. COLORADO AVENUE
GLENDORA, CA 91740

WESTLAND EQUIPMENT CORP.
13370 EUCLID AVENUE
ONTARIO, CA 91761

WHITE'S SALES & RENTALS
424 E. FOOTHILL
AZUSA, CA 91702

WHITNEY MACHINERY, INC.
20 IOWA AVENUE
RIVERSIDE, CA 92507

WILLIAMS JAMES CONCRETE
14229 E. LOMITAS AVENUE
LA PUENTE, CA 91746

WILSON ENGINE & EQUIPMENT
2128 GROVE AVENUE
ONTARIO, CA 91761

WOLLER EQUIPMENT, INC.
1100 S. JELLECK AVENUE
INDUSTRY, CA 91744

WOOD BACKHOE SERVICE
19866 REEDVIEW
ROWLAND HEIGHTS, CA 91748

YALE INDUSTRIAL TRUCKS
OF SOUTHERN CALIFORNIA
2615 S. PELLISSIER PLACE
INDUSTRY, CA 91744

*YAMASHITA LANDSCAPING
5004 N. GLENDORA
COVINA, CA 91722

*RESPONDENT

YOSHI'S LAWNMOWER SHOP
821 E. ARROW HWY.
POMONA, CA 91766

*RESPONDENT

APPENDIX M

APPENDIX M

Table A.3 -- Prospective Industry Support For The Equipment Technology Program

BUSINESS	D	L	P	S	W
A-1 Lou's Rental	X				
Aloha Landscape			X		
Baldwin Park Unified School District			X		X
Bob's Garden Machinery	X				
Caltrans					X
Chino Welding & Assembly		X	X		X
City of Azusa				X	X
City of Commerce					X
City of LaVerne			X	X	
City of Pico Rivera				X	
City of Pomona Water Department					X
C. R. Cook Ford Tractors		X			X
Dodson Loader Service	X				X
Eberhard Equipment			X		
Environmental Care			X		X
Gerlack Landscape			X		
Hertz Equipment Rental					X
Industry Equipment Rental Inc.	X	X	X		X
John Deere Company	X	X			
Kubota Tractor	X	X			
Lewis' Saw & Lawnmower	X		X		
Pacific Equipment & Irrigation Inc.	X				
Rowland Unified School District					X
Simon Equipment Co., Inc.			X		
Steve's All American					X
Valencia Heights Water Company			X		X

D--Donation L--Equipment Loan P--Promotion
S--Scholarship/Financial Assistance W--Work Experience

APPENDIX N

APPENDIX N

EQUIPMENT TECHNOLOGY ADVISORY COMMITTEE

BALDWIN PARK UNIFIED
SCHOOL DISTRICT
KARL FEKETE
3699 NORTHHOLLY AVENUE
BALDWIN PARK, CA 91706
(818) 962-3311, EXT. 237

CALTRANS
FRED CULBUIAS
21420 E. GOLDEN SPRINGS ROAD
WALNUT, CA 91789
(818) 357-1141

CHINO WELDING AND ASSEMBLY
BOB WERTS
16379 CHINO CORONA RD.
CHINO, CA 91710
(714) 597-4716

CITY OF AZUSA
ROBERT DELOACH
213 E. FOOTHILL BLVD.
AZUSA, CA 91702
(818) 334-5125

CITY OF COMMERCE
PARKS AND RECREATION
TOM MAPLES
2535 COMMERCE WAY
COMMERCE, CA 90040
(213) 722-4805, EXT. 211

CITY OF LA VERNE
DAVID JOHNSON
3660 D STREET
LA VERNE, CA 91750
(714) 596-8739

CITY OF POMONA WATER DEPT.
TONY SKVAREK
P. O. BOX 660
POMONA, CA 91769
(714) 620-2231

CITY OF WEST COVINA
MORRIS WOLFF
P. O. BOX 1440
WEST COVINA, CA 91793
(818) 814-8458

COVINA VALLEY
VERNON LOTT
519 EAST BADILLO
COVINA, CA 91723
(818) 331-3371

C. R. COOK FORD TRACTORS
PETE FIORENZA
14550 E. GARVEY BLVD.
BALDWIN PARK, CA 91706
(818) 962-2486

DODSON LOADER SERVICE
DALE E. DODSON
P. O. BOX 342
131 S. 3RD STREET
COVINA, CA 91723
(818) 331-7786

ENVIRONMENTAL CARE, INC.
HOWARD MEES
8500 MIRAMAR PLACE
SAN DIEGO, CA 92121
(619) 458-1900

GLENN B. DORNING, INC.
BILL ELLIS
1744 E. HOLT BLVD.
ONTARIO, CA 91761
(714) 983-2089

INDUSTRY EQUIPMENT
RENTALS,INC.
HAROLD L. ANDERSON
822 SOUTH NOGALES STREET
CITY OF INDUSTRY, CA 91748
(818) 965-4901

JOHN DEERE COMPANY
DAVE ROCK
10650 HARRY HINES
P. O. BOX 20598
DALLAS, TEXAS 75220
(714) 685-1870

KUBOTA TRACTOR
TOM KANE
550 W. ARTESIA
COMPTON, CA 90224
(213) 537-2531

METROPOLITAN WATER DISTRICT
OF SOUTHERN CALIFORNIA
RONALD E. WHEELER
1111 SUNSET BLVD.
P. O. BOX 54153
(213) 250-6593

TAYLOR RENTAL CORPORATION
SPENCER WEDDLE
732 W. ARROW HWY.
SAN DIMAS, CA 91773
(714) 599-9378

TELECT WEST
MARK JOHNSON
14340 E. ARROW HWY.
BALDWIN PARK, CA 91706
(818) 960-9581

TURNERS, INC.
JIM LOTHRIDGE
5072 MISSION BLVD.
ONTARIO, CA 91762
(714) 628-8908

VALENCIA HEIGHTS WATER CO.
HERMAN WESKAMP
3009 VIRGINIA AVENUE
WEST COVINA, CA 91791
(818) 332-8935

APPENDIX O

APPENDIX O

GENERAL EDUCATION REQUIREMENTS FOR MT. SAN ANTONIO COLLEGE 1987-1988

Philosphy of General Education

Mt. San Antonio College believes that in granting an associate degree the College must not only certify that the recipient has acquired a level of competency in a specific course of study, but must also insure that graduates have a broad general knowledge of the physical world and its inhabitants, and understanding of the achievement of humankind, and the ability to think and communicate in a clear and logical manner. In specifying these general education requirements, the intent of the College is to encourage each graduate to attain this knowledge in a manner consistent with the graduate's interest and goals.

General Education Requirement:

At least 24 units required, which shall include courses in each of the General Education areas A through E.

Area A:
The English Language and Critical Thinking (6 units)

ENGL	1A	Freshman Composition, or
ENGL	1H	Freshman Composition, Honors, and
SPCH	1A	Public Speaking, or
SPCH	1H	Public Speaking , Honors

Area B:
The Physical Universe and Life (3 units)

ASTR	5	Introduction to Astronomy
ASTR	6	Astronomical Observing
CHEM	1A	General Chemistry
CHEM	1B	General Chemistry
CHEM	2A	Fundamentals of Chemistry
CHEM	2B	Fundamentals of Chemistry
GEOG	1	Geography; Physical Elements
GEOL	1	Physical Geology
GEOL	2	Historical Geology
GEOL	7	Geology of California
GEOL	8	Earth Science
GEOL	8L	Earth Science Laboratory
GEOL	9	Environmental Geology
METO	3	Weather and the Atmospheric Environment
OCEA	10	Introduction to Oceanography
OCEA	10A	Introduction to Oceanography
PHSC	7	Physical Science
PHSC	7L	Physical Science Laboratory

PHYS	1	Physics
PHYS	1L	Physics Laboratory
PHYS	2A(G)	General Physics
PHYS	2AL	Physics Laboratory
PHYS	2A(M)	Premedical Physics
PHYS	2B(B)	General Physics
PHYS	2BL	Physics Laboratory
PHYS	2B(M)	Premedical Physics
PHYS	4A	Engineering Physics

Life

AGOR	1	Horticultual Science
ANAT	1	Introductory Physiology
ANAT	10A	Anatomy and Physiology
ANAT	10B	Anatomy and Physiology
ANAT	35	Human Anatomy
ANTH	1	Physical Anthropology
BIOL	1	General Biology
BIOL	2	Plant and animal Biology
BIOL	3	Field Biology
BIOL	6	Humans and the Environment
BIOL	6L	Humans and the Environment Laboratory
BIOL	20	Marine Biology
BIOL	21	Marine Biology Laboratory
BTNY	1	Plant Structure and Functions
BTNY	2	Plant Diversity
MICR	1	Bacteriology and Microbiology
MICR	4	Bacteriology and Microbiology Laboratory
PSYC	1B	Physiological Psychology
ZOOL	1	Zoology
ZOOL	2	Zoology

Area C:
Arts, Literature, Philosophy, and Foreign Language (6 units)
(No more that one course from any single group.)
Arts:

ART	1	Appreciation of Art
ART	4	Art History: Prehistoric through Gothic
ART	5	Art History: Renaissance through Modern
ART	6	Art History: Modern Art
ART	9	Art History: Asian
ART	10	Art History: American Art
ART	13	Humanities Through the Arts
ART	14	Introduction to Art Fundamentals
ART	15A	Drawing, Beginning
ART	17A	Drawing, Life
ART	20	Design: Two-Dimensional
ART	22	Design: Three-Dimensional
ART	25A	Painting, Beginning
ART	30A	Ceramics, Beginning
ART	40A	Sculpture, Beginning
DRMA	9	Introduction to Theatre Arts

DRMA	20	History of Theatre Arts
DRMA	11	Principles of Acting
MUS	7	Fundamentals of Music
MUS	11A	Music Literature Survey
MUS	11B	Music Literature Survey
MUS	13	Introduction to Music Appreciation
PHOT	15	History of Photography
Civilizations:		
HIST	3	History of Western Civilization
HIST	4	History of Western Civilization
HIST	5	History of England and Great Britain
HIST	6	History of England and Great Britain
HIST	10	History of Asia
HIST	11	History of Asia
HIST	35	History of Africa
Literature:		
ENGL	1B	English: Introduction to Literary Types
HUMA	1	The Humanities
LIT	1	Masterpieces of American Literature
LIT	2	Modern American Literature
LIT	5	Introduction to Dramatic Literature
LIT	6A	Survey of English Literature
LIT	6B	Survey of English Literature
LIT	11A	World Literature
LIT	11B	World Literature
LIT	14	Introduction to Modern Poetry
LIT	15	Introduction to the Cinema
LIT	25	Contemporary Mexican-American Literature
LIT	33	Images of Women in Literature
LIT	36	Introduction to Mythology
LIT	46	The Bible as Literature
LIT	47	The Bible as Literature
Philosophy:		
PHIL	5	Introduction to Philosophy
PHIL	15	Major World Religions
Foreign Language:		
CHIN	1	Chinese
CHIN	2	Chinese
CHIN	3	Chinese
CHIN	4	Chinese
FRCH	1	French
FRCH	2	French
GERM	1	German
GERM	2	German
ITAL	1	Italian
ITAL	2	Italian
INTR	80	American Sign Language
JAPN	1	Japanese
JAPN	2	Japanese
RUSS	1	Russian
RUSS	2	Russian
SPAN	1	Spanish

SPAN	2	Spanish
SPAN	11	Spanish for Spanish Speaking
SPAN	12	Spanish for Spanish Speaking

Area D:
Social, Political, and Economic Institutions (6 units)
United States History and American Institutions (3 units)

HIST	1	History of the U.S.
HIST	7	History of the U.S.
HIST	8	History of the U.S.
HIST	30	History of the Black American
HIST	31	History of the Black American
HIST	36	Women in American History
HIST	40	History of the Mexican-American
POLI	1	Political Science
POLI	25	Politics of the Mexican-American

Elective Course: At least one course (3 units) to be selected from the following:

AGAG	1	Food Production: Land Use and Politics, A Global Perspective
AGFR	20	Conservation Of Natural Resources
ANTH	5	Principles of Cultural Anthropology
ANTH	22	General Cultural Anthropology
BUSC	1A	Principles of Economics
BUSC	1B	Principles of Economics
BUSC	39	The American Economy
BUSM	20	Principles of Business
CHLD	1	Home, Child, and Community Relations
CHLD	10	Child Growth and Development
CIS	10A	Computer Information Systems
CIS	12	Microcomputer Applications
GEOG	2	Geography, Cultural
GEOG	30	Geography of California
GEOG	32	Environmental Geography
HIST	19	History of Mexico
HIST	30	History of the Black American
HIST	31	History of the Black American
HIST	36	Women in American History
HIST	37	History and Culture of Native Americans
HIST	38	History of Southern California
HIST	39	California History
HIST	40	History of the Mexican-American
JOUR	30	Introduction to Mass Media
JOUR	31	Aspects of Mass Media
POLI	2	Political Science
POLI	5	Political Science Theory
POLI	9	Introduction to International Relations
POLI	25	Politics of the Mexican-American
PSYC	1A	General Psychology
SOC	1	Sociology
SOC	14	Marriage and the Family
SOC	15	Child Development

Area E:
Lifelong Understanding and Self-Development (3 units)

BIOL	5	Health Science and Substance Abuse
BIOL	13	Human Reproduction, Development, and Aging
BIOL	15	Human Sexuality
GUID	5	Career/Life Planning
HEFN	25	Essentials of Nutrition
HEFN	63	Basic Principles of Nutrition
HMEC	41	Life Management
PSYC	26	Psychology of Sexuality
SPCH	26	Interpersonal Communication

APPENDIX P

APPENDIX P

CORE COURSES AND CURRICULUM FOR THE MT. SAN ANTONIO COLLEGE, AGRICULTURAL SCIENCES DEPARTMENT 1988-1989

CORE COURSES:

AGAG 5	Agriculture Industry Orientation	0.5
EQUP 20	Agricultural Mechanics	2
AGAB 20A	Intro to Microcomputers for Agriculture	1
AGAB 20B	Microcomputer Applications in Agriculture	2
AGAB 23	Agricultural Sales and Service	3
AGAG 91	Agricultural Calculations	3
		11.5

COURSE CONTENT

AGAG 5 - AGRICULTURE INDUSTRY ORIENTATION .5 UNITS
Lecture - 9 hours

A course to familiarize students with the occupational opportunities in all agricultural areas and to assist students with program selection. This course must be taken by all first semester agricultural majors.

OBJECTIVES:

1. To develop knowledge of the agriculture industry in California and the United States.
2. To develop a knowledge of career choices available in the agriculture industry.
3. To orient the student to agricultural science.
4. To identify the student's program advisors.

TOPICAL OUTLINE: (by week)

1. Program Orientation
2. Livestock Industry
3. Dairy Industry

4. Pet Industry

5. Horticulture Industry

6. Forestry Industry

7. Agriculture Business

8. Agricultural mechanization

9. Animal Health Technology

EQUP 20 - AGRICULTURAL MECHANICS 2 UNITS
Lecture - 18 hours Laboratory - 54 hours

Basic mechanical skills used in agriculture, horticulture, and forestry. Instruction emphasizes concrete, wood, metal work, tool maintenance, safety, electricity, plumbing, arc welding, and oxyacetylene welding. Laboratory includes actual hands-on application of these skills.

OBJECTIVES: (To be able to:)

1. Safely operate power and hand tools necessary to construct projects.

2. Safely maintain tools.

3. Cut, ream, thread and fasten steel pipe and fittings.

4. Properly cut and glue plastic pipe and fittings.

5. Properly cut, ream and solder copper pipe and fittings.

6. Oxyacetylene weld.

7. Arc weld two pieces of metal together.

8. Select and use the proper fasteners.

9. Estimate materials needed for projects.

TOPICAL OUTLINE: (by week)

1. Introduction to course and laboratory safety procedures

2. Safety and use of power tools

3. Tool identification and safe use applications

4. Figuring bills of materials
5. Sketching and drawing
6. Selection of lumber, fasteners and hardware
7. Tool fitting
8. Woodworking and carpentry
9. Midterm
10. Concrete
11. Sheet metal work
12. Plumbing
13. Electricity
14. Arc welding
15. MIG and TIG welding
16. Oxyacetylene welding
17. Oxyacetylene cutting and brazing
18. Final exam

AGAB 20A - INTRO TO MICROCOMPUTERS FOR AGRICULTURE 1 UNIT
Lecture - 18 hours

A course in the operation and selection of computer hardware and software as it relates to agriculture. Student will gain actual hands-on experience with microcomputers.

OBJECTIVES:

1. To offer the students knowledge of hardware and software materials available for microcomputers.
2. To instruct the students in the application of microcomputer programs for production analysis and agri-business management.
3. To offer the student an opportunity to learn basic concepts and use a microcomputer.
4. To analyze and evaluate software.
5. To demonstrate a knowledge of computer literacy.

6. To be able to select the proper hardware for home or business applications.

TOPICAL OUTLINE: (by week)

1. Introduction to course - overview and the importance of microcomputers in agriculture

2. Microcomputer hardware - computer components and operation procedures

3. Using software programs designed for agricultural applications

4. Using the microcomputer for word processing

5. Using a data base program for agriculture

6. Using a spreadsheet program for agriculture - Final exam

AGAB 20B - MICROCOMPUTER APPLICATIONS IN AGRICULTURE 2 UNITS
Lecture - 36 hours

A course in the functions and capabilities of microcomputer programs as they relate to agriculture. Emphasizes the use of word processing, data base, spreadsheets, and graphic programs for students interested in agricultural business; nursery, and landscape management; machinery management; and farm management.

OBJECTIVES:

1. To offer the students knowledge of hardware and software material available for microcomputers.

2. To instruct the students in the application of microcomputer programs for production analysis and agri-business management.

3. To offer the student an opportunity to learn basic concepts and use a microcomputer.

4. To analyze and evaluate software.

5. To demonstrate a knowledge of computer literacy.

6. To be able to select the proper hardware for home or business applications.

TOPICAL OUTLINE: (by week)

1. Introduction to course and computer lab
2. Word processing using the microcomputer
3. Word processing using the microcomputer
4. Data base management programs for agricultural application - Agri-business
5. Data base management programs for agricultural application - nursery and landscape management
6. Data base management programs for agricultural application - farm management
7. Data base management programs for agricultural application - farm management
8. The use of spreadsheets as they apply to Ag Business Management
9. The use of spreadsheets as they apply to Nursery and Landscape Management
10. The use of spreadsheets as they apply to Machinery Management
11. The use of spreadsheets as they apply to Farm Management
12. Final Exam

AGAB 23 - AGRICULTURAL SALES AND SERVICE 3 UNITS
Lecture - 54 hours

A course in the promotion and sales of agricultural products. Sales problems and techniques as they apply to today's market will be emphasized.

OBJECTIVES:

1. To demonstrate a knowledge of human relations, how it relates to the selling and servicing of production agriculture.
2. To be able to explain the role of the salesperson in servicing the production sector of agriculture.

3. To demonstrate a knowledge of salesmanship techniques and the responsibility of the salesperson to the consumer.

4. To analyze and evaluate the salesperson as a problem solver and communicator.

5. To be able to make a sales presentation in a hypothetical role playing situation.

6. To explain the nature of consumer buying habits as they relate to agricultural products.

TOPICAL OUTLINE: (by week)

1. Sales as a service to the agricultural economy

2. Understanding agricultural producers as customers

3. The salesperson as a problem solver

4. Human relations in sales

5. The salesperson as a communicator

6. Prospecting

7. Types of sales presentations

8. Sales presentation - opening

9. Sales presentation - presenting the product

10. Sales presentation - close

11. Overcoming objections

12. Display and promotion

13. Merchandising and packaging

14. Advertising

15. Sales management and supervision

16. Demonstration and sales presentation of an agricultural product

17. Demonstration and sales presentation of an agricultural product

18. Final exam

AGAG 91 - AGRICULTURAL CALCULATIONS 3 UNITS
Lecture - 54 hours

A course in calculations as they apply to modern technical agriculture. Instruction includes percentages, discounts, interests, equations, formulas, linear measurements, areas, volumes, ratios, and proportions.

OBJECTIVES: (To be able to:)

1. Formulate the proper concentration and application of medicinals, electrolytes, disinfectants, herbicides, insecticides, and other farm chemicals.
2. Field calibrate seeding equipment, spray rigs, and liquid and dry chemical proportioners.
3. Graphically plot and interpret feed conversion, growth rates, and rates of production.
4. Balance rations using concentrated premixes and home-grown hay and grain.
5. Compute and evaluate rates of application of seed, fertilizer, water, and pesticidal materials.

TOPICAL OUTLINE: (by week)

1. Fundamentals of mathematics review
2. Fundamentals of mathematics review
3. Calculating, graphing and analyzing rates of growth and feed conversion of large livestock
4. Calculating, graphing and analyzing hen day and hen housed production of the poultry flock
5. Calculating, graphing and analyzing production records of small livestock and laboratory animals
6. Calculating, graphing and analyzing production rates of dairy cattle
7. Practice in calibrating seeders to include knapsack, gate, broadcasters and drills
8. Calculating and analysing seeding rates to include field germination checks
9. Computing concentration and dilutions

10. Determining the accuracy of liquid proportioners -- Water measurement

11. Determining drug dosages for large livestock

12. Determining drug dosages for dogs, cats and birds

13. Graphing and interpreting production curves of crops

14. Calculating fertilizer rates--Field calibration of fertilizer applicators

15. Calculating rates of pesticidal materials

16. Field calibration of sprayrigs and dust applicators

17. Standardization of butterfat and solids non-fat in liquid milk

18. Review and final exam

APPENDIX Q

APPENDIX Q

ORIGINAL PROGRAM REVISION PROPOSAL

The Equipment Technology Program was first proposed to the College Curriculum Committee as an Associate in Science Degree in Equipment Technology and three separate certificates: Agricultural Equipment Technology, Industrial Equipment Technology, and Landscape Equipment Technology. These three certificate programs are described in this appendix. Each of the certificates contained basically the same courses but were divided into the three separate fields to achieve the following objectives:

1. To meet the individual needs of the students.
2. To meet the specialized needs of the surrounding industry.
3. To increase enrollment potential.
4. To increase program marketability.
   a. The college catalog would publish the programs in the three separate sections.
   b. Advertising brochures could be designed to attract individual interests.
5. To establish a professional working relationship between the Natural Science Division (Agricultural and Landscape) and the Industrial Studies Division (Industrial).

The College Curriculum Committee evaluated this proposal and determined that overall the program revisions were appropriate but that different course prefix and numbers for each of the certificates would cause a managerial problem for the records office.

ORIGINAL PROGRAM REVISION PROPOSAL
ASSOCIATE IN SCIENCE DEGREE--EQUIPMENT TECHNOLOGY

DESCRIPTION:

This program is intended to prepare students for entry level employment and advancement. Students will obtain a balance of technical knowledge, theory, and principles along with basic skill development. Students planning to obtain an Associate in Science Degree in Equipment Technology must complete the 11.5 units of core courses, 25 units from one of the certificate options, and 24 units of General Education.

CORE COURSES:		UNITS
AGAG 5	Agriculture Industry Orientation	.5
AGMC 20	Agricultural Mechanics	2
AGAB 20A	Intro to Microcomputers for Agriculture	1
AGAB 20B	Microcomputer Applications in Agriculture	2
AGAB 23	Agricultural Sales and Service	3
AGAG 91	Agricultural Calculations	3

REQUIRED COURSES: (choose one option)

I -Agricultural Equipment Technology Certificate	24
II -Industrial Equipment Technology Certificate	24
III -Landscape Equipment Technology Certificate	24

GENERAL EDUCATION REQUIREMENTS: 24
(see Appendix G)

To meet the specifications of the College Curriculum Committee the Equipment Technology Program was reorganized to offer an A.S. degree and two certificate options. The course prefix was narrowed to EQUP. See Section 5.5, p.111, for a summary of the approved program.

ORIGINAL PROGRAM REVISION PROPOSAL
LANDSCAPE EQUIPMENT TECHNOLOGY CERTIFICATE

DESCRIPTION:

This program of study is designed to prepare students for entry level positions or skill enhancement in the operation, service, maintenance, and repair of landscape equipment.

REQUIRED COURSES:		UNITS
AGOR 1	Horticultural Science	3
AGOR 14A	Landscape Tractor Operation	2
AGOR 14B	Advanced Tractor Operation	2
AGOR 16	Landscape Equipment Operation	2
AGOR 54	Surveying Skills	1
AGOR 55	Small Engine Repair	2
AGOR 56	Hydraulics	3
AGOR 59A	Landscape Equipment Repair - Electrical	1
AGOR 59B	Landscape Equipment Repair - Trouble Shooting	1
AGOR 59C	Landscape Equipment Repair - Oxyacetylene Welding	2
AGOR 59D	Landscape Equipment Repair - ARC Welding	2
AGAG 13	Seminar In Agricultural Occupations	1
AGAG 61	Work Experience	3
TOTAL		25

APPENDIX R

APPENDIX R

DEFINITION OF TERMS

Addressee

One to whom the questionnaire is sent with the intent that they will become a respondent.

Advisory Committee

A committee comprised of representatives from related industries who advise the instructional institute.

Basic Metalworking

Construction of metal projects using the proper tools correctly.

Basic Woodworking

Construction of projects made of wood using the proper tools correctly.

Certificate

A document testifying that one has fulfilled the course requirements of a program. This differs from a degree program in that a certificate program does not include general education classes.

Closing Date

The date after which no further questionnaires are counted as returns.

Contractor

One who executes plans under contract; especially, one who agrees to supply labor and/or materials.

Day Class

An educational course offered between the hours of 8:00 A.M. and 4:00 P.M.

Degree

A title conferred upon students by a college, university, or professional program of study.

Diesel Engine Repair

Diagnosis, maintenance, and repair of diesel type engines that are commonly used for equipment power.

Equipment Dealer

A private agency that sells and services equipment.

Equipment Donation

A gift or sponsorship to the instructional institute of tools or equipment that will benefit the instructional program.

Equipment Drive Trains

Clutches, transmission, differentials, hydraulics, hydrostatics, and gear drive units used in transmitting power from an engine to the output of that piece of equipment.

Equipment Electrical Systems

Wiring, generators, alternators, switches, fuses, relays, and other electrical components used to transmit electrical power.

Equipment Loan

The act of lending to the instructional institute tools or equipment for the instructional program.

Equipment Maintenance

Proper service and adjustment to equipment so it will operate efficiently.

Equipment Technology

A training program that provides skilled technicians who help develop, market, apply, operate, service, and maintain agricultural, landscape, and industrial equipment.

Equipment Trouble Shooting

The act of diagnosing trouble within the power unit and evaluating the best possible solution to correcting the problem.

Frequency

Is the number of times a response occurs in the data. Frequency is a count.

Full Term Courses

Classes 18 weeks, one semester, in length.

Gasoline Engine Repair

Diagnosis, maintenance, and repair of gasoline engines that are commonly used for equipment power.

Hand Tool

Tools that require physical force to operate.

Heavy Equipment Mechanic

One who repairs large frame equipment; i.e., crane, earth mover, large bulldozer.

Heavy Equipment Operator

One who operates heavy frame equipment; i.e., crane, earth mover, large bulldozer.

Hydraulics Repair

Diagnosis, maintenance, and repair of hydraulic systems that are used on power equipment.

Irrigation Design

The study or act of designing an irrigation system that will give the proper coverage and fulfill the irrigation requirement of the design area.

Irrigation Repair/Installation

The act of repairing and installing irrigation systems for residential and commercial applications.

Late Afternoon Class

An educational course offered between the hours of 3:00 P.M. and 7:00 P.M.

Mechanized Agriculture

A training program that provides skilled technicians who help develop, market, apply, operate, service, and maintain agricultural equipment.

Medium Equipment Mechanic

One who repairs medium frame equipment; i.e., backhoes, skiploaders, small crawler type tractors, forklifts.

Medium Equipment Operator

One who operates medium frame equipment; i.e., backhoes, skiploaders, small crawler type tractors, forklifts.

Municipality

An incorporated town, or city.

Night Class

An educational class that is offered between the hours of 6:00 P.M. and 10:00 P.M.

On-Site Work Experience

Filling a work position as a trainee with college supervision and credit.

Pneumatics

Diagnosis and repair of compressors and air tools commonly used in this industry.

Post-Secondary Education

The education that an individual receives after completion of a high school diploma.

Power Tool

Tools that require alternate power to operate; i.e., electric, engine, pneumatics.

Recapitulation

In research, the final or semifinal step in preparation of report tables.

Respondent

One who responds or answers the questionnaire.

Safety

The ability to understand and practice the methods of accomplishing work in a manner to prevent danger or risk.

Sample Population

A segment of the population selected for drawing inferences concerning the total population.

Short Term Courses

Classes less than the normal 18 weeks duration.

Small Engine Repair

Diagnosis, maintenance, and repair of small engines, both gasoline and diesel, that are commonly used for small equipment power.

Small Light Equipment Mechanic

One who repairs small frame equipment; i.e., lawnmowers, chainsaws, garden tractors.

Small Light Equipment Operator

One who operates small-frame equipment; i.e., lawnmowers, chainsaws, garden tractors.

Surveying

Accurate measurement of surface areas and elevations.

Technical Skill

Acquired ability in a specific vocational area.

Tool Maintenance

Keeping tools in proper working condition.

Urbanization

The process by which rural areas become transformed into urban areas.

Utility Company

A company that supplies a utility service to people; i.e., gas, water, electric.

Welding

Properly joining two pieces of metal together by fusion.

BIBLIOGRAPHY

BIBLIOGRAPHY

Adams, Gerald R. and Schvaneveldt, Jay D. Understanding Research Methods. New York: Longman Inc., 1985.

Bondi, Joseph C. and Wiles Jon. Curriculum Development: A Guide to Practice. 2nd ed. Columbus: Charles E. Merrill Publishing Company, 1984.

Borg, Walter R. and Gall, Meredith D. Educational Research An Introduction. 2nd ed. New York: David McKay Company Inc., 1976.

California Community College Directory, California Association of Community College Press, 1988.

California, Department of Education, Commission for the Review Of The Master Plan For Higher Education, The Challenge of Change, A Reassessment of the California Community Colleges, March 1986.

California, Department of Education, Planning Committee on Vocational Education, The California Five-Year State Plan For Vocational Education, Vol I, 1977, pp. 1-24.

California, Department of Education, Title 5, Assembly Bill 1725, 1986.

Connelly, Catherine and Saxton, Steven, How to Develop and Use Labor Market Information in Local Occupational Program Planning. California: California Occupational Information Coordinating Committee, 1982.

Crunkilton, John R. and Finch, Curtis R. Curriculum Development in Vocational and Technical Education: Planning, Content, and Implementation. Boston: Allyn and Bacon Inc., 1979.

de Vaus. D. A., Surveys in Social Research. Boston: George Allen and Unwin, 1986.

Erdos, Paul L. Professional Mail Surveys. New York: McGraw-Hill Book Company, 1970.

Ferber, Robert, ed. Handbook of Marketing Research. New York: McGraw Hill Book Company, 1974. Section II, Part B: Data Collection Methods Mail Survey, by Paul L. Erdos.

Feyereisen, Kathryn V., Fiorino, A. John, and Nowak Arlene T. Supervision and Curriculum Renewal: A Systems Approach. New York: Appleton - Century - Crofts, 1970.

Friedman, Herbert, Introduction to Statistics. New York: Random House Inc., 1972.

Gibson, James Loren, "Occupational Competencies Needed By Persons Entering Selected Farming Operation." Ph. D. dissertation, Michigan State University, 1974.

Groves, C. L. , Quantum Leap: Vocational Education Reform. American Association of Community and Junior Colleges, 1985.

Grubb, W. "The Bandwagon Once More: Vocational Preparation for High-Tech Occupations." Harvard Educational Review 54 (1985): 429.

Howard, William J. "Power and Machinery." Agricultural Engineering. March 1987, pp. 14-15.

Marshall, Joseph C. Director of Research and Information Management, California State Polytechnic University Pomona, California. Consultation, 19 May 1989.

Mt. San Antonio College Catalog. Walnut: California, 1987-1988.

Mt. San Antonio College Information Notebook. Vol. 12. 1985.

Mt. San Antonio College, Office of Admission and Records, Enrollment Census : 1950 - 1951, 1960 - 1961, 1970 - 1971, 1980 - 1981.

Palen, John J. The Urban World. New York: McGraw-Hill Book Company, 1981.

Rugg, Harold. "Curriculum Making: Past and Present." 26th Yearbook Part I of the National Society for the Study of Education. Chicago: University of Chicago Press, 1926.

Somers, Gerald G., and Little, J. Kenneth, eds. Vocational Education: Today and Tomorrow. Wisconsin: University of Winsconsin, 1971. Chapter 2: Changing Goals, by Melvin L. Barlow.

Taba, Hilda. Curriculum Development: Theory and Practice. New York: Harcourt Brace Jovanovich, 1962.

"Taking Stock of the Valley's vanishing agriculture." San Gabriel Valley Tribune. 11 May 1988, Sec D, p. 1.

Travers, Robert M. W. An Introduction to Educational Research. 3rd ed. New York: Macmillan Company, 1969.

Tyler, Ralph W. Basic Principles of Curriculum and Instruction. Chicago: University of Chicago Press, 1949.

U.S. Department of Commerce, Bureau of the Census, Characteristics of the Population, 1950, 1960, 1970, and 1980.

U.S. Congress. House. Law Revision Council. United States Code 1982 Edition, Vol 8. 1983.

Weskamp, Herman W. Professor Emeritus, Mt. San Antonio College. Walnut, California. Interview, 10 November 1987.

GENERAL REFERENCES

Alger, Leon J., "A Rationale for the Establishment of Area Vocational Education Programs in Michigan." Ph.D. dissertation, Michigan State University, 1967.

Bear, W. Forrest, and Hoerner, Thomas A. Planning Organizing and Teaching Agricultural Mechanics. St. Paul: Hobar Publications, 1978.

Comprehensive Dissertation Index(s), 1861-1985. Vols. 1, 2, and 3. Ann Arbor: University Microfilms Inc.

Current Index to Journals in Education (CIJE) Washington D.C.: U.S. Office of Education, Bureau of Research, 1988.

Doty, Charles R. ed. Developing Occupational Programs. New Directions For Community Colleges series, no. 58. San Francisco: Jossey-Bass Inc., Publishers, 1987.

Driscoll, Roy L., ed. Pomona Valley Community Book. Pomona: A. H. Crawston, 1950.

Dziech, Billie Wright, ed. Controversies and Decision Making in Difficult Economic Times. New Directions For Community Colleges series, no. 53. San Francisco: Jossey-Bass Inc., Publishers, 1986.

Educational Resources Information Center (ERIC) Washington D.C.: U.S. Office of Education, Bureau of Research, 1988.

Fullan, Michael. The Meaning of Educational Change. New York: Teachers College Press, 1982.

Gibson, James Loren, "Occupational Competencies Needed by Persons Entering Selected Farming Occupations." Ph.D. dissertation, Michigan State University, 1974.

Gomez, Kwanchai A., and Gomez, Arturo A. Statistical Procedures For Agricultural Research. 2nd ed. New York: Wiley-Interscience Publication, 1984.

Hetzel, Glen Hayward, "Systematic Approach to the Development of an Agricultural Engineering Course." Ph.D. dissertation, Michigan State University, 1980.

Janssens, Daniel and Pessemier, E.A. Response Rates In Mail Surveys: A review and Survey, no. 714. Indiana: Purdue University, [1980].

Kline, Cernyw Kenneth, "The Design and Preliminary Testing of a Mechanization Training Program for Trainees with Low Levels of Education." Ph.D. dissertation, Michigan State University, 1970.

Kopecek, Robert J. and Clarke, Robert G. eds. Customized Job Training For Business and Industry. New Directions For Community Colleges series, no. 48. San Francisco: Jossey-Bass Inc., Publishers, 1984.

Martorana, S. V. and Piland, William E. eds. Designing Programs for Community Groups. New Directions For Community Colleges series, no. 45. San Francisco: Jossey-Bass Inc., Publishers, 1984.

Nie, Norman H.; Hull, C. Hadlai; Jenkins, Jean G.; Steinbrenner, Karin.; and Bent, Dale H. Statistical Package For The Social Sciences. 2nd ed. New York: McGraw-Hill Book Company, 1975.

Pflueger, Donald H. Covina. Pasadena: Grant Dahlstrom at the Castle Press, 1964.

Posner, George J. and Rudnitsky, Alan N. Course Design: A Guide To Curriculum Development For Teachers. 2nd ed. New York: Longman Inc., 1982.

Pratt, David. Curriculum: Design and Development. New York: Harcourt Brace Jovanovich, Inc., 1980.

Schmid, Calvin F., and Schmid, Stanton E. Handbook of Graphic Presentation. 2nd ed. New York: John Wiley and Sons, Inc., 1979.

Ukena, Ann Seymour. Statistics Today. New York: Harper and Row Publishers, 1978.

United States, Department of Health, Education, and Welfare, Office of Education, Agricultuiral Equipment Technology - A Suggested 2-Year Post High School Curriculum, 1970.

Vocational and Occupational Information Center for Educators (VOICE) Sacramento: California State Department of Education, 1988.

Voegel, George H. Advances in Instructional Technology. New Directions For Community Colleges series, no. 55. San Francisco: Jossey-Bass Inc., Publishers, 1986.

COLLEGE CATALOGS
SOUTHERN CALIFORNIA COMMUNITY COLLEGES

Allan Hancock College Catalog. Santa Maria, 1986-1987.

Antelope Valley College Catalog. Lancaster, 1986-1987.

Bakersfield College Catalog. Bakersfield, 1986-1987.

Barstow Community College Catalog. Barstow, 1986-1987.

Cabrillo College Catalog. Aptos, 1986-1987.

Cerritos College Catalog. Norwalk, 1986-1987.

Cerro Coso Community College Catalog. Ridgecrest, 1986-1988.

Chaffey College Catalog. Alta Loma, 1987-1988.

Citrus College Catalog. Azusa, 1986-1987.

Coastline Community College Catalog. Fountain Valley, 1986-1987.

College of the Canyons Catalog. Valencia, 1986-1987.

College of the Desert Catalog. Palm Desert, 1986-1987.

College of the Sequoias Catalog. Visalia, 1986-1987.

Compton Community College Catalog. Compton, 1986-1987

Crafton Hills College Catalog. Yucaipa, 1986-1987.

Cuesta College Catalog. San Luis Obispo, 1986-1987.

Cuyamaca College Catalog. El Cajon, 1986-1987.

Cypress College Catalog. Cypress, 1986-1987.

East Los Angeles College Catalog. Monterey Park, 1986-1987.

El Camino College Catalog. Torrence, 1986-1987.

Fresno City College Catalog. Fresno, 1986-1987.

Fullerton College Catalog. Fullerton, 1986-1987.

Gavilan College Catalog. Gilroy, 1986-1987.

Glendale Community College Catalog. Glendale, 1986-1987.

Golden West College Catalog. Huntington Beach, 1986-1987.

Grossmont College Catalog. El Cajon, 1986-1987.

Hartnell College Catalog. Salinas, 1986-1987.

Imperial Valley College Catalog. Imperial, 1983-1985.

Irvine Valley College Catalog. Irvine, 1986-1987.

Kings River Community College Catalog. Reedly, 1985-1986.

Long Beach City College Catalog. Long Beach, 1984-1985.

Los Angeles City College Catalog. Los Angeles, 1986-1987.

Los Angeles Harbor College Catalog. Wilmington, 1986-1987.

Los Angeles Metropolitan College Catalog. Los Angeles, 1986-1987.

Los Angeles Mission College Catalog, San Fernando, 1986-1987.

Los Angeles Pierce College Catalog. Woodland Hills, 1986-1987.

Los Angeles Southwest College Catalog. Los Angeles, 1986-1987.

Los Angeles Trade-Technical College Catalog. Los Angeles, 1986-1987.

Los Angeles Valley College Catalog. Van Nuys, 1986-1987.

Mira Costr College Catalog. Oceanside, 1986-1987.

Monterey Peninsula College Catalog. Monterey, 1986-1988.

Moorpark College Catalog. Moorpark, 1986-1987.

Mount San Antonio College Catalog. Walnut, 1986-1987.

Mount San Jacinto College Catalog. San Jacinto, 1985-1987.

Orange Coast College Catalog, Costa Mesa, 1986-1987.

Oxnard College Catalog. Oxnard, 1986-1987.

Palomar College Catalog. San Marcos, 1986-1987.

Palo Verde College Catalog. Blythe, 1986-1987.

Pasadena City College Catalog. Pasadena, 1986-1987.

Porterville College Catalog. Porterville, 1986-1987.

Rio Hondo College Catalog. Whittier, 1986-1987.

Riverside Community College Catalog. Riverside, 1986-1987.

Saddleback Community College Catalog. Mission Viejo, 1986-1987.

San Bernardino Valley College Catalog. San Bernardino, 1986-1988.

San Diego City College Catalog. San Diego, 1986-1987.

San Diego Miramar College Catalog. San Diego, 1986-1987.

Santa Ana College Catalog. Santa Ana, 1984-1985.

Santa Barbara City College Catalog. Santa Barbara, 1986-1987.

Santa Monica College Catalog. Santa Monico, 1981-1983.

Southwestern College Catalog. Chula Vista, 1986-1987.

Taft College Catalog. Taft, 1985-1987.

Ventura College Catalog. Ventura, 1986-1987.

Victor Valley College Catalog. Victorville, 1986-1987.

West Hills College Catalog. Coalinga, 1985-1987.

West Los Angeles College Catalog. Culver City, 1986-1987.