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Evaluation of the industrial-education program at Iowa State University, 1959-1969

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by

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INTRODUCTION

Statement of the Problem

Change in industrial education has been a continuous process. According to Cochran, "The field of industrial education has been in a constant state of flux and reorientation since its early inception..." (7, p. 1). However, just because change has existed does not mean that its importance should be minimized. Today change is even more vital than it was in the previous years of industrial education. Industry, the primary influence on industrial education, changes constantly as its evolution continues and accelerates. Introduction of new products, processes, and materials forces changes upon industry in order for it to maintain its competitiveness in the mainstream of progress.

Pressure must be exerted on education to enable it to continue meeting the needs of an industrial society. Wilber's statement, "The crying need of today is for reexamination of our present culture and of the school program toward the end of bringing the two into harmony" (26, p. 6) indicates that the need does exist. However, the existence of the need is not enough to promote action to bring industry and education together, for as Olson observes, there is "...the seemingly characteristic resistance of industrial arts to the influences of new concepts in purpose and curriculum" (17, p. 28). Because of this resistance, those who are engaged in industrial education should keep in mind, "To adequately prepare students for careers in a dynamically evolving academic and business world, it is the responsibility of every educational institution to be aware of the changing needs which its graduates must be prepared to fulfill" (15, p. 3).

Stadt makes the following statement which seems to reinforce that idea--"Teachers of teachers will have to be much more sure of the teaching and other abilities of the professional and para-professionals in the future" (22, p. 17).

An inference to be made from the preceding quotations is that industrial educators must seek sources other than their own experiences in order to remain aware of the changing needs, and to continue to adequately prepare graduates for employment. They must strive to overcome inertia and seek to determine what the content of their program is to be.

The industrial-education program at Iowa State University has two curricula from which students may choose. They are the industry-option curriculum and the teaching-option curriculum.

As a result of completing the industry option, the graduate has prepared himself for one or more of the many positions in the vast complex of enterprises known as industry. Industry for this purpose is defined as "...an institution in our culture which, through the application of knowledge and the utilization of men, money, machines, and materials, produces goods or services to meet the needs of man" (8, p. 54). Industry includes 1. producing commodities by manufacturing or processing; 2. distributing commodities; 3. purchasing, selling or other related financial transactions involving commodities; 4. servicing of commodities or of equipment used in production of commodities. Within the framework of any of these categories, an individual may be engaged in activities such as analysis, management, research and development, supervision, teaching, writing, engineering, employee relations, or public relations.

The teaching-option graduate, however, is not directly engaged in activities of industry. His preparation enables him to interpret industry. In elementary, secondary, or post-secondary classrooms, his responsibility is to develop within his pupils an understanding of the many facets of industry.

In either situation--teaching or industrial employment--the actions of industry influence the actions of the graduates. Industry changes constantly to meet demands placed on it for more, better, and less-expensive products. As industry changes, the responsibilities of the graduates change also. The educator faces the need for updating his teaching. The industrial employee must keep abreast of the changes in his specific industry.

It is this constant change that makes it difficult to design a fixed curriculum which will continuously satisfy the needs of the graduates. Because of their involvement either in the interpretation of industry or in the actual operations of industry, the graduates are a logical resource to use in determining how to most adequately meet the needs of future graduates. That idea is verified by Roy's statement, "Professional familiarity occurs in depth in individuals devoting full-time to a particular profession. ...the individual forms a series of personal ideas or convictions concerning every phase of his field's operation" (20, p. 7). Communication between the industrial-education staff and the graduates actively involved in the interpretation and operation of industry is needed.

The problem, then, is: There is a need to investigate the industrial-education program of studies at Iowa State University to determine its adequacy in meeting the needs of its graduates.

Purpose of the Study

Graduates of the two curricula of the program of industrial education at Iowa State University become aware of their occupational needs as they face their changing responsibilities within their occupational situations.

The purpose of this study is to aid in the development of an improved industrial-education program by seeking out opinions held by graduates relative to their needs, and using these opinions as a means to help determine the recommended course emphasis.

The findings of the study are expected to be helpful 1. to undergraduate industrial-education majors who are planning curricula tailored to specific personal goals; 2. to the advisors who guide students in preparing such curricula; and 3. to administrative and instructional personnel in structuring their courses, curricula, and programs.

Objectives of the Study

There are three major objectives which are to be realized to enable the purpose of the study to be achieved.

The first objective is to group the graduates according to factors relating to their occupational classification and specific area of work.

The second objective is to determine the degree of importance that is placed on course content within major instructional areas.

The third objective is to determine what course content is considered necessary to enable the graduates to meet the needs of the various occupations.

Delimitations of the Study

The data were collected with a mailed questionnaire. The population to whom the questionnaires were sent was the graduates of the Iowa State University industrial-education program who received Bachelor of Science degrees from August, 1959, through August, 1969.

Inquiries were made about the content of major instructional areas and factors relating to the individual graduate. There was no attempt made to evaluate individual courses or instructors.

Assumptions of the Study

It is assumed that the opinions of graduates are a valid resource to be used as a means for determining curriculum content. It must also be assumed that a questionnaire will elicit objective and accurate information.

Definitions

The following operational definitions are given to make possible a more complete understanding of this study.

Areas of work -- Classification of specific responsibilities found within occupational groups listed in the Dictionary of Occupational Titles (24).

Course -- An instructional unit or series of units usually identified by department and number, e.g. I. Ed. 260, and offered over a period of one quarter.

Course content -- The teachable elements of the instructional units contained in a course.

Curriculum -- "...an orderly arrangement of the integrated subjects, activities, and experiences which students pursue for the attainment of a specific goal " (10, p. 13).

Industrial arts -- The part of industrial education which consists of non-vocational, exploratory educational experiences relating to the workings of industry (10).

Industrial education -- "...a broad term that includes all educational activities dealing with modern industry. It is an inclusive term used when referring to industrial arts and vocational-industrial education" (10, p. 17).

Industry -- "...an institution in our culture which, through the application of knowledge and the utilization of men, money, machines, and materials, produces goods or services to meet the needs of man" (8, p. 54).

Industry option -- A curriculum of the industrial-education program at Iowa State University which provides opportunity for students to prepare themselves for occupations in industry.

Instructional area -- A group of courses related to each other, e.g. electricity-electronics, power mechanics.

Occupational groups -- Categories of job titles as listed in the Dictionary of Occupational Titles (24).

Program -- The total offering of educational experiences under the direction of an administrative unit, e.g. department.

Teaching option -- A curriculum of the industrial-education program at Iowa State University which provides opportunity for students to prepare themselves for occupations in education.

REVIEW OF LITERATURE

This review of literature consists of two sections. The first is a discussion of descriptive studies in general. The second is a discussion of some studies which are similar to or otherwise related to this study.

Descriptive Studies

In education, descriptive research serves several important purposes. Borg (4) lists the following: 1. as a means of determining current conditions, 2. as a direct source of knowledge of human behavior, 3. as a help in internal evaluation and improvement.

Hillway lists the same purposes and adds, "... and whenever possible, to draw valid general conclusions from the facts discovered" (12, p. 175).

Ranck, in a follow-up of physical education graduates, apparently agreed, at least in part, with Hillway (12) and Borg (4) when he stated, "Determination of what has been done in the past, as well as what is being done at the present, provides a sound basis in future decisions and development of programs" (18, p. 3).

The two terms, follow-up and evaluation, when used to describe studies, are frequently considered synonymous. According to a dictionary definition, a follow-up is, "A system of pursuing an initial effort by supplementary action" (25, p. 324). Evaluation, according to the same source, refers to examination for the purpose of judging. By considering examination as a system of pursuing, and judging as supplementary action, the two terms may be used to mean the same thing. In the literature searched as a preliminary to this study, it was found that both terms,

follow-up and evaluation, were used interchangeably to describe descriptive studies which were made to determine existing conditions and to discover information potentially useful for internal improvement.

This interchangeability is exemplified by the following illustrations. John Best used the term follow-up when he explained the purpose of such a study in this manner. "The follow-up study investigates the influence that a course of study, a process, or an institution has had upon an individual or group of individuals" (3, p. 123). Michael O'Brien titled his doctoral dissertation thusly, "Evaluation by Graduates of the Program of Agricultural Engineering at the Iowa State College" (16).

Of the devices used for gathering information for descriptive research, the interview and the questionnaire appear to be the most common. Agreement does not exist as to which is the better. The mailed questionnaire is the more frequently used, but this fact is not necessarily a testimonial in favor of the questionnaire. It seems that both have certain advantages and disadvantages which necessitate important consideration.

The following quotations serve to differentiate between them. Good states, "The questionnaire is generally regarded as a form distributed through the mail..." (11, p. 270). Borg defines the interview as a research method used for, "...the collection of data through direct verbal interaction between individuals" (4, p. 221).

The major advantage of the interview, according to Borg, is its adaptability (4). He goes on to explain, though, that the adaptability, if not carefully controlled by a skilled interviewer, can also be the major flaw, leading to bias and subjectivity. Interraction between

individuals in the form of eagerness to please and, conversely, antagonism, may also decrease the effectiveness.

The following advantages of the questionnaire--it provides wide coverage for less cost, it is impersonal, and it allows uniformity in questioning--may explain some of its popularity (14). The major disadvantage of the questionnaire seems to be the problem of non-returns, but there are others as well. Gedker says it is overused, imperfections in design are possible, questions are frequently ambiguous, respondents may exhibit lack of interest, and carelessness in completion may occur (9).

In designing a study, careful consideration must be made of the problem, the time available, and the funding available. These factors are extremely important when selection of a survey method is made.

A descriptive, evaluative, or follow-up study is a type of research which is frequently employed when information on current conditions, knowledge of human behavior, or evaluation and improvement is desired. Common methods of acquiring information for studies of this nature are the personal interview and the mailed questionnaire. Each method has certain advantages and disadvantages which must be considered when a survey instrument is to be used.

Related Studies

A study of the industrial-education graduates of the Iowa State College who graduated between 1921 and 1950 was made by Benson Udoh (23). He listed six main objectives which included information on: 1. occupational adjustment, 2. methods of placement, 3. reasons for selection of

curriculum, 4. number who pursued additional education, 5. value of industrial experience, 6. suggestions for improvement of curriculum.

The data were gathered with a four-page questionnaire which was sent to 225 graduates. There were 181 replies from 24 states and the District of Columbia. Slightly more than 62.0 percent of the graduates were employed in Iowa at the time of the survey. There were 13 graduates, 7.19 percent, in Illinois. Those remaining were not concentrated geographically in large numbers. Those classified under teaching number 108, 67.6 percent. At the junior high school level there were 41, and at the senior high school level there were 65. Seventy-three, 32.4 percent, were grouped as non-teaching. Of these, forty-one, 56.0 percent, were in supervisory positions in business and industry.

In general, teaching graduates appeared to be more satisfied with their job preparation than non-teaching graduates. To the direction, "Indicate the extent to which your college program gave you the proper professional and technical foundation for your work" (23, p. 72), over 80.0 percent of those in teaching replied 'much', but only 42.0 percent of those in non-teaching replied that way.

The courses were listed by instructional areas and evaluated according to their practical or professional value. Bacteriology was rated 'of no value' by 54.0 percent, calculus by 48.0 percent. Botany, biology, analytical geometry, and European and American civilization were also rated 'of no value' by many with, respectively, 40.0 percent, 32.0 percent, 23.0 percent, and 20.0 percent. Those courses ranked highly were speechmaking with 76.0 percent replying 'of much value'; composition, 66.0 percent;

student teaching 65.0 percent; shop planning, 64.0 percent; safety, 62.0 percent; business correspondence, 59.0 percent.

Industrial-education courses were also rated 'of much value' by large percentages of respondents. Drafting was rated by 82.0 percent to be 'of much value'. Crafts had only 47.0 percent of the respondents classifying it in the 'of much value' category. All other industrial-education laboratory courses were classified between these two extremes.

Of the industrial-education non-laboratory courses, only four were rated 'of much value' by less than 50.0 percent. These were coordination of industrial education, 29.0 percent; social significance of industrial education, 17.0 percent; foundations of industrial education, 15.0 percent; history of industrial education, 9.0 percent. The percentages listed in the preceding text were by respondents with no differentiation between areas of employment. Although there was some variation between teaching and non-teaching groups, the percentages of replies were similar.

The final chapter of the study was a summary of the findings. There were no conclusions or recommendations (23).

Wiltsie's study was concerned with occupational status of the 1945 - 1955 Iowa State College industrial-education graduates.

His objectives were:

1. To ascertain the status of industrial education graduates entering fields in industry and teaching.
2. To analyze the factors which have tended to change the status of industrial education graduates.
3. To provide data for studying the factors relating to the success of the industrial education graduate entering industry (27, p. 1).

Although 23 states were represented, the majority, 54.1 percent, of the respondents lived in Iowa. A total of 207 responded. Ninety-eight were classified in the teaching group and 109 in non-teaching. Senior and junior high school were the two areas in which the preponderance of teachers were employed. College teaching accounted for only 7.0 percent. Most of the non-teaching group were employed in engineering, supervision, or sales with 37.0 percent, 12.0 percent, and 9.0 percent respectively.

The median salary range reported for those in teaching was $4,001 to $4,500. The median range for non-teachers was $5,501 to $6,000.

The graduates were asked to evaluate courses they took with respect to their present position. The findings were summarized in the following manner:

> There was considerable variance of rating the values of the college courses between the teaching group and the group in industry. The teaching group ratings of the top five subjects contributing most to present job position were, in descending order of frequency: woodworking, 71.6 percent; drawing, 66.5 percent; shop planning, 56.9 percent; general metal, 57.0 percent; machine shop, 40.0 percent. The industry group ratings were: drawing, 66.8 percent; English, 56.2 percent; speech, 53.5 percent; machine shop, 48.3 percent; guidance, 35.9 percent.
>
> A similar variance between the two groups was shown in their respective ratings of courses considered of advantage as electives. The top five areas of study according to the teaching group were: General shop, 39.1 percent; education, 36.7 percent; visual aids, 29.9 percent; mathematics, 23.6 percent; physical sciences, 19.6 percent. In contrast, the industry group ratings were: general engineering, 31.6 percent; mathematics, 27.5 percent; general shop, 23.6 percent; physical sciences, 19.6 percent; social sciences, 14.5 percent (27, p. 35).

Although no conclusions were made by the author, it could be concluded that teachers and non-teachers place different values on courses when they evaluate them on the basis of their professional needs.

Scholten (21) also studied industrial-education graduates at Iowa State University. His study differed from the others in that the population he queried was limited to those who graduated during the period of 1951 - 1961 who were in non-teaching vocations only. The objectives of his study were:

1. To analyze the factors which lead an industrial-education graduate to enter industry.
2. To find out what kind of jobs industrial-education graduates enter.
3. To discover how the graduates contacted their jobs.
4. To determine what courses were of most value in securing and holding their present position (21, p. 1).

Two sections of the questionnaire were related to courses or course content. In one of those sections the question, "What minor area would you suggest industrial-education majors study in preparing for non-teaching employment?" (21, p. 42), two minor areas, business administration and industrial engineering, each received 23.5 percent of replies. The other areas: mathematics, 10.4 percent; agriculture, 5.0 percent; sales, 10.8 percent; safety, 6.2 percent; labor relations, 12.2 percent; drafting and design, 11.3 percent; and others, 1.6 percent; were not as highly recommended.

In the other section that was related to courses or course content, the respondent was asked, "Rate the following Industrial Education courses as to their value to you personally in your present position" (21, p. 42). Those courses were engineering graphics, design, wood finishing, machine wood working, general metals, machine metalwork, welding, basic electricity, electronics, motor rewind, crafts, philosophy of vocational education,

laboratory planning, methods of teaching industrial arts, and student teaching. A three-point rating scale with the categories 'little value', 'some value', and 'much value' was used.

Engineering graphics was the only course rated to be of 'much value' by more than half of those who answered. Slightly over 53.0 percent rated it of 'much value'. Five other courses were rated of 'much value' by more than 30.0 percent, however. They were electronics, 38.3 percent; basic electricity, 34.5 percent; welding, 33.0 percent; machine metal work, 32.5 percent; design, 30.9 percent. Several were rated of 'little value' by more than half. They are philosophy of vocational education, 71.6 percent; wood finishing, 70.0 percent; crafts, 68.3 percent; methods of teaching industrial arts, 60.8 percent; school shop planning, 55.0 percent; machine woodworking, 52.4 percent. Student teaching was rated of 'little value' by 48.0 percent.

It was suggested, "...that the required course offering for students taking the industrial option should be different from those required for students entering the teaching profession" (21, p. 31).

Gedker (9), who investigated only industrial-education courses, also discovered that the practical experience was important. In his study it was found to be equally as important as the technical areas and more important than educational-methods courses. The need for practical experience exists not only in industrial education. In a follow-up of guidance graduates, Butts (5) concluded that the most helpful part of the preparation was the practicum. Nelson (15), who asked what courses were the most beneficial, discovered that the South Dakota State University

guidance and counseling graduates also believed the practicum was the most valuable.

Bear (2), in a study of the Iowa State University agriculture engineering graduates, sought information pertaining to the graduates' family background, high school, reasons for attending college, type and duration of employment, income, additional education, professional activities and opinions as to emphasis to be placed on certain courses. He received replies from 95.58 percent of the 408 graduates of the 1942 to 1962 period. It was discovered that, in 1962, 37.0 percent of the graduates were employed in Iowa. However, 75.0 percent were employed in the north central states. For determining course emphasis, he used a four-point rating scale with the following categories: 'increase', 'about right', 'decrease', 'not essential for a B.S.'. An increase in the emphasis on the following courses was recommended by those surveyed: speech, 44.8 percent; English composition, 35.5 percent; economics, 21.2 percent; differential equations, 21.0 percent; physics, 16.9 percent; and calculus, 13.2 percent. About 6.0 percent indicated differential equations was not essential to a B.S.

Between 30.0 percent and 66.0 percent of those persons employed in design, administration, research and development, sales and service, and supervision recommended an increase in the amount of English and speech. Supervisory personnel indicated the highest percentages--47.0 percent recommended increases in English, and 66.0 percent recommended more speech. Zoology, botany, and bacteriology are thought to be not essential by 84.0 percent, 80.0 percent, and 81.0 percent respectively. By contrast, 78.0 percent favored an increase in statistics.

It was recommended that consideration of the recommendations be given when course content and curriculum offering are evaluated. "These recommendations should indicate the need and serve as a basis for curriculum evaluation" (2, p. 148).

O'Brien (16) conducted an earlier investigation of the agricultural-engineering graduates in 1951. His purpose was to obtain an evaluation of selected courses, the employment status, and the major interest while in school of the 1910 - 1950 graduates. He received an 87.0 percent return from the 534 questionnaires sent out. The graduates were classified according to employment at the time of the study. Education was found to have a larger number of graduates than any other occupational outlet. There were 125 employed in some area of education. The remaining 340 were in such areas as industry related to agriculture, farm-equipment industry and farm operation or management.

Courses from four areas were selected to be evaluated. The areas were agriculture, agricultural engineering, engineering, and science. Within the science area were five courses: speech making, journalism, differential equations, social studies, and economics.

A three-point rating scale with three categories: 'too much', 'about right', and 'too little', was used as a means to evaluate the courses. It was concluded that the emphasis upon speech, journalism, social studies and economics was too little. The remaining course, differential equations, was thought to have received about the right amount of emphasis.

In the other areas, agreement seemed to exist that the emphasis was about right.

The conclusion from the study was that, "...the constant revision of the curriculum which has taken place has tended to meet with the approval of those who graduated in agricultural engineering" (16, p. 78).

Rhea's (19) study was, "...designed to assemble in a more satisfactory and detailed manner some evidences of evaluation generally found by keeping an ear-to-the-ground" (19, p. 4). To acquire such information, a questionnaire was sent to graduates of the Iowa State College division of agriculture of the 1931 to 1951 period. Specifically the questionnaire was to gather, "Information concerning first and present occupation, advanced degrees earned, value of counselor, value of course work, recommendations for curriculum changes and opinions concerning other items..." (19, p. 27). Two areas, occupation of graduates and income of graduates, received disproportionate treatment. A report of the recommended changes in emphasis on subject fields indicated that 52.0 percent favored an increase in emphasis on communications (English, speech, etc.), whereas natural and social sciences had satisfactory emphasis. Seventy-one percent indicated no change needed in natural science, and 56.0 percent indicated no change needed in social science (19).

The review of literature, according to Borg, "provides you with the means of getting to the frontier in your particular field of knowledge" (4, p. 41).

In carrying out this review of literature, a variety of sources were consulted. Among those cited are unpublished manuscripts from universities and colleges in Minnesota, Kansas, South Dakota, Utah, and Iowa. Acquisition of ideas concerning methods, approaches, and measures from these and other sources certainly justifies a thorough review of literature.

The studies and other sources examined revealed agreement in the value of follow-up or evaluative studies. It can be said that studies of this nature are an important tool in educational research. Where recommendations were made, it was reported that the opinions of graduates should be respected when changes in curriculum are to be made.

It was found that a large majority of graduates remain in the geographical area of the university from which they graduated.

The concensus seems to be that in the general education part of curricula, only one area has consistently received too little emphasis. That area is communicative skills. Most studies report that more writing and speaking skills are needed. In industrial education, the area of drafting was reported to be of value by most graduates.

METHOD OF PROCEDURE

Population

The graduates awarded the Bachelor of Science degree between August 1, 1959, and August 31, 1969, were selected for the study. There were 314 who graduated during that period. Addresses were not available for nine, which left 305 to whom questionnaires were sent. Two hundred forty-eight returned usable questionnaires for a return percentage of 81.

The Instrument

The objectives of the study were given careful consideration before actual construction of the instrument was begun. To satisfy the first objective, to classify the graduates according to occupational factors, two resources, Industrial Education Job Opportunities (6) and Dictionary of Occupational Titles (24), were consulted. The first resource is a list of industrial classifications in which some industrial-education graduates are employed and a description of those classifications. The second is a list of occupational titles and detailed definitions published by the Manpower Administration of the United States Department of Labor. It was decided to fit the industrial-education occupations into the categories listed in the Dictionary of Occupational Titles (24).

All of the classifications on Carver's (6) list were included in one or the other of the following two major occupational classifications found in the Dictionary of Occupational Titles (24) -- 1. Professional, Technical, and Managerial; 2. Administrative Specializations. Six of the occupational classifications included in the two major classifications were listed on the

questionnaire. Within each occupational classification, the Dictionary of Occupational Titles (24) lists a number of areas of work. Nine areas were selected to be used on the questionnaire. Also, in each case an additional category, other, was included to assure that each person who would reply would be able to categorize his position. As a means to verify the occupation listed, space was supplied for brief descriptions of title and position. Space for such additional information as salary, size of firm, and nature of firm was also provided. Similarly, classification of educational occupations and areas of work from the Dictionary of Occupational Titles (24) were also included in the questionnaire.

To satisfy the second objective, to determine the degree of importance placed on course content, a study was made of the courses listed for the industrial-education curricula in the Iowa State University General Catalog (13). The description of each course was examined and a digest of its content made. In some cases where the subject matter of one course was an expansion of a previous course, only one digest was included. These digests were grouped with a rating scale according to instructional areas and included on the questionnaire.

The completed questionnaire was evaluated by members of the industrial-education faculty. An improved copy was distributed to ten selected graduates living in the Ames area. Five of the questionnaires were returned with comments by the graduates, and five were completed in the presence of the researcher. Consideration of the comments was made, and a final draft of the instrument was written, approved, and duplicated.

The first mailing was completed April 22, 1970, the second May 13, 1970, and the third and final was sent July 14, 1970.

As the forms were returned, they were examined and the data were coded and recorded on 80-column forms. The data were then key punched on 80-column Hollerith cards. Frequency counts were calculated for each item. It was then possible to determine the number and types of responses that were made by categories or classifications.

It was these calculations that enabled realization of the third objective, to determine what course content is considered necessary to enable graduates to meet the needs of the various occupations.

FINDINGS

The purpose of this study was to aid in the development of an improved industrial-education program by seeking out opinions held by graduates relative to their needs, and using these opinions as a means to determine the recommended course emphasis.

The findings are presented in two major divisions. These divisions are status of graduates, and importance placed on course content. Within the divisions, the findings are subdivided, where applicable, according to general findings, in which information common to both groups is presented; findings relating to teaching-option graduates, and findings relating to industry-option graduates.

Status of the Graduates

A preliminary investigation indicated that there were graduates employed in most of the states of the United States, so it was decided to use geographic regions as location categories. These regions were the Northeast, South, Midwest, Southwest, Northwest, and out of the country.

States east and north of the southern and western boundaries of Pennsylvania and Maryland were considered the Northeast. The South was all states east and south of the northern and western extremes of Louisiana, Arkansas, Kentucky, and West Virginia. The Southwest, the largest area, included those states to the south and west of Nevada, Utah, Colorado, and Kansas. The Northwest was made up of Washington, Oregon, Idaho, Montana, Wyoming, and Alaska. The Midwest consisted of those states remaining: North and South Dakota, Nebraska, Minnesota, Iowa, Missouri, Illinois, Wisconsin, Michigan, Indiana, and Ohio.

Questionnaires were sent to 304 graduates. Returns were received from 248. Of these, the majority, 191 or 77.0 percent, were employed in the midwest. One-hundred thirty, 52.0 percent of the total, were located in Iowa. As is illustrated by Table 1, the Southwest was reported to be the residence for 35 graduates, a total of 14.0 percent. The South, the Northeast and the Northwest were reportedly home for 3.6 percent, 2.8 percent, and 1.6 percent respectively. Two individuals reported from locations other than the United States.

Table 1. Geographic location by major occupational classification

	Education		Industry		Totals	
	N	%	N	%	N	%
Northeast	1	.4	6	2.4	7	2.8
South	3	1.2	6	2.4	9	3.6
Midwest	97	39.0	94	38.0	191	77.0
Southwest	10	4.0	25	10.0	35	14.0
Northwest	2	.8	2	.8	4	1.6
Out of country	-		2	.8	2	.8
Totals	113	45.4	135	54.4	248	100.0
Iowa only	83	33.0	47	19.0	130	52.0

There were 153 who graduated from the teaching option, and 95 from the industry option. At the time of the survey, however, only 113 reported being employed in some phase of education, while 135 indicated industry employment.

On the survey instrument, salaries were listed in $1,000 increments with the extremes being less than $6,000 and more than $25,000. More than 60.0 percent, as is reported by Table 2, indicated a salary between $8,000 and $13,000. The median salary was about $10,500. In computing the approximate median salary, those who indicated salary less than $6,000 were not considered,

and of course the 14 who did not indicate salary range could not be considered either.

Table 2. Reported salary of graduates

Dollars	Number	Percentage
Less than $6000	8	3.2
6001 - 7000	9	3.6
7001 - 8000	20	8.1
8001 - 9000	31	12.5
9001 - 10000	36	14.5
10001 - 11000	34	13.7
11001 - 12000	28	11.3
12001 - 13000	25	10.1
13001 - 14000	14	5.7
14001 - 15000	10	4.0
15001 - 16000	9	3.6
16001 - 17000	5	2.0
17001 - 18000	1	0.4
18001 - 19000	-	
19001 - 20000	2	0.8
20001 - 21000	1	0.4
21001 - 22000	1	0.4
Did not report	14	5.7
Total	248	100.0

Median, $10,500

There were seven classifications for those who were employed in education. All except two of the 14 who classified their institution as a college or university were actually employed by the institution. The two who weren't employed by the institution indicated that they were teaching religion and were supported by another source. The most common education classification was high school, in which 38.0 percent classified themselves. However, 13.2 percent were classified in a junior - senior high school. The next highest

frequency was junior high school with 20.4 percent. One person employed in a vocational rehabilitation school classed himself in the 'other' category. The complete list of frequencies appears in Table 3.

Table 3. Classification by type of school

School	Number	Percentage
College or university	14	12.4
Vocational-technical	11	9.7
High school 10 - 12	27	23.9
High school 9 - 12	16	14.1
Junior - senior high school 7 - 12	15	13.2
Junior high school 7 - 9	23	20.4
Elementary K - 6	1	.9
Elementary K - 8	5	4.5
Other	1	.9
Total	113	100.0

As illustrated by Table 4, schools of 1,000 to 2,500 student population were the place of employment for 31.8 percent. The 501 to 1,000 student

Table 4. Size of institution by student population

Population	Number	Percentage
1 - 50	2	1.8
51 - 100	1	.9
101 - 200	4	3.5
201 - 500	22	19.5
501 - 1000	27	23.9
1001 - 2500	36	31.8
Over 2500	15	13.2
No answer	6	5.4
Total	113	100.0

institution was also high in percentage, 23.9 percent were employed by institutions of this size. Schools of less than 200 student population employed only seven of the 113 respondents.

Industrial education constituted the major responsibility for 72.6 percent of the education employed. Table 5 reveals the relative amount of time the respondents spent in industrial-education activities.

Table 5. Assignment in industrial education

Time	Number	Percentage
Fulltime	82	72.6
3/4 time	4	3.5
1/2 time	5	4.4
1/4 time	2	1.8
No industrial education assignment	17	15.0
No answer	3	2.7
Total	113	100.0

Those who had no industrial-education assignment indicated that administration or full-time teaching in some other discipline was their primary responsibility.

Salaries ranged from less than $6,000 per year to between $20,000 to $21,000 per year. The median, as reported in Table 6, was slightly below $10,000 per year. Of those who replied, 81.0 percent reported salaries between $7,000 and $13,000.

Table 6. Reported annual salary of education employed

Salary	Number
Less than $6000	4
6001 - 7000	5
7001 - 8000	14
8001 - 9000	23
9001 - 10000	14
10001 - 11000	19
11001 - 12000	12
12001 - 13000	10
13001 - 14000	5
14001 - 15000	2
15001 - 16000	2
16001 - 17000	1
17001 - 18000	-
18001 - 19000	-
19001 - 20000	-
20001 - 21000	1
No answer	1
Total	113
Median, $9,890.50	

In Table 7, the frequency of occurrence of salary range according to type of school is disclosed. The individual reporting the highest salary is in the college classification. The lowest salary range was indicated by two classifications, 'college' and 'high school 10 - 12'.

Table 7. Salary by type of school

Salary	College	Vo-Tech.	H.s. 10-12	H.s. 9-12	Jr.-sr. h.s. 7-12	Junior h.s. 7-9	Elementary K-6	Elementary K-8	Other	Total
Less than $6000	3	-	1	-	-	-	-	-	-	4
6001 - 7000	-	1	3	-	1	-	-	-	-	5
7001 - 8000	-	-	2	3	4	4	-	-	-	13
8001 - 9000	2	1	3	5	3	7	-	-	1	22
9001 - 10000	1	-	5	1	3	4	-	-	-	14
10001 - 11000	1	3	5	3	-	5	-	1	-	18
11001 - 12000	3	2	2	1	1	2	-	-	1	12
12001 - 13000	-	3	3	2	2	-	-	-	-	10
13001 - 14000	1	-	2	-	-	1	-	-	1	5
14001 - 15000	1	-	-	-	1	-	-	-	-	2
15001 - 16000	1	-	-	1	-	-	-	-	-	2
16001 - 17000	-	-	1	-	-	-	-	-	-	1
17001 - 18000	-	-	-	-	-	-	-	-	-	-
18001 - 19000	-	-	-	-	-	-	-	-	-	-
19001 - 20000	-	-	-	-	-	-	-	-	-	-
20001 - 21000	1	-	-	-	-	-	-	-	-	1
21001 - 22000	-	-	-	-	-	-	-	-	-	-
22001 - 23000	-	-	-	-	-	-	-	-	-	-
23001 - 24000	-	-	-	-	-	-	-	-	-	-
No answer	-	-	1	-	-	-	1	4	-	6
Total	14	10	27	16	15	23	1	5	2	113

Although 31 classified their school as one with junior and senior high school grades, apparently only two of those are actually junior high school teachers. The data which appears on Table 8 indicates the level of teaching which makes up the major portion of the respondents' responsibility. As is evident by Table 8, senior high school teaching had more than twice the number as junior high school teaching.

Table 8. Education occupational groups

	Number	Percentage
College or university	12	10.6
Senior high school	58	51.4
Junior high school	25	21.1
Elementary	1	.9
Handicapped	4	3.6
Vocational-technical	11	9.7
Other	2	1.8
No answer	1	.9
Total	113	100.0

The data in Table 9 is the indicated salaries for the education occupational classifications. Of the five classifications, the senior high school median is the lowest at $9,250. The highest is vocational-technical with $11,500.

The areas of work for education which are listed in the Dictionary of Occupational Titles (24) include instruction and administration. Subdivisions of the instructional area which were used are: multi-field industrial laboratory instruction, which is also referred to as the general shop; single-field industrial laboratory instruction, often referred to as limited general shop;

Table 9. Salary by education occupational classification

Salary	College	Senior h.s.	Junior h.s.	Elementary	Handi-capped	Vo-tech.	Other	Total
Less than $6000	3	1	-	-	-	-	-	4
6001 - 7000	-	5	-	-	-	-	-	5
7001 - 8000	-	10	4	-	-	-	-	14
8001 - 9000	2	11	7	-	1	1	-	22
9001 - 10000	1	8	5	-	-	-	-	14
10001 - 11000	1	7	6	-	1	3	1	19
11001 - 12000	2	4	2	-	1	3	-	12
12001 - 13000	-	6	-	-	1	3	-	10
13001 - 14000	1	3	1	-	-	-	-	5
14001 - 15000	1	1	-	-	-	-	-	2
15001 - 16000	-	1	-	-	-	1	-	2
16001 - 17000	-	-	-	-	-	-	-	-
17001 - 18000	-	-	-	-	-	-	1	1
18001 - 19000	-	-	-	-	-	-	-	-
19001 - 20000	-	-	-	-	-	-	-	-
20001 - 21000	-	-	-	-	-	-	-	-
21001 - 22000	1	-	-	-	-	-	-	1
22001 - 23000	-	-	-	-	-	-	-	-
No answer	-	1	-	1	-	-	-	2
Totals	12	58	25	1	4	11	2	113
Medians	$11,000	$9,250	$9,300		$11,000	$11,500		

and area-unit industrial laboratory instruction, known also as the unit shop (1). The frequencies of replies for the various categories of instruction which appear in Table 10 total more than 113, which is the number of respondents who classified themselves in the education group. Apparently some respondents are teaching in more than one instruction category.

As can be seen on Table 10, there are many who indicated the category 'other'. Additional industrial laboratory instruction was indicated in carpentry, construction technology, strength of materials, evaluation of handicapped, auto body, vocational construction, and refrigeration and air conditioning. The non-industrial laboratory instruction classifications in addition to those found on the questionnaire were driver education, mathematics, religion, physics, audio-visual, and professional subjects.

Salary indications for the education areas of work are found on Table 11.

The percentage and number of those in education who were employed in the various geographic regions can be seen in Table 12. The percentages remained somewhat consistent in most of the classifications, categories and groups, as is evident by the following Tables, 13 through 19.

Industry-employed graduates were dispersed more than those in education. The greater percentage, though, was in the Midwest. Only slightly over one-third, 34.8 percent, were employed in Iowa at the time of the survey. The Southwest was the only other geographic region with an appreciable number. Twenty-five, 18.6 percent, were located in that area. The complete regional distribution is reported on Table 20.

Table 10. Education areas of work

Area	Number	Total
Instruction		
Multifield industrial laboratory		16
Singlefield industrial laboratory		
General drafting	17	
General electricity	12	
General graphic arts	1	
General metals	15	
General plastics	4	
General power	11	
General wood	19	
Other	1	80
Area unit industrial laboratory		
Mechanical drafting	12	
Architectural drafting	2	
Electricity-electronics	18	
Graphic arts	1	
Foundry	5	
Machine metals	5	
Sheet metal	2	
Metallurgy	1	
Plastics	3	
Welding	5	
Automechanics	17	
Fluid power	1	
Other	7	79
Non-industrial education		
Professional subjects	2	
Related subjects	4	
Guidance and/or counseling	2	
Other	12	20
Administration		
Principal	1	
Supervisor	1	
Superintendent	1	
Director	2	
Business administrator	-	
Coordinator	9	
Buildings and grounds	2	
Other	2	18

Table 11. Salary by educational area of work

Area	No answer	Less than 6000	6001 - 7000	7001 - 8000	8001 - 9000	9001 - 10000	10001 - 11000	11001 - 12000	12001 - 13000	13001 - 14000	14001 - 15000	15001 - 16000	16001 - 17000	20001 - 21000	Total
Instruction															
Multifield industrial laboratory	-	-	1	4	7	-	4	-	-	-	-	-	-	-	16
Singlefield industrial laboratory															
General drafting	-	-	-	4	6	4	-	3	-	-	-	-	-	-	17
General electricity	-	-	-	1	1	4	1	3	2	-	-	-	-	-	12
General graphic arts	-	-	-	1	-	-	-	-	-	-	-	-	-	-	1
General metals	-	-	2	3	2	2	2	2	1	1	-	-	-	-	15
General plastics	-	-	-	1	-	2	-	1	-	-	-	-	-	-	4
General power	-	-	1	4	1	3	2	-	-	-	-	-	-	-	11
General wood	-	-	-	7	4	4	-	3	1	-	-	-	-	-	19
Other	-	-	-	-	-	1	-	-	-	-	-	-	-	-	1
Total	-	-	3	21	14	20	5	12	4	1	-	-	-	-	80
Area unit industrial laboratory															
Mechanical drafting	-	1	-	2	5	-	1	2	1	-	-	-	-	-	12
Architectural drafting	-	-	-	1	1	-	-	-	-	-	-	-	-	-	2
Electricity-electronics	1	1	1	2	4	-	3	2	1	2	-	1	-	-	18
Graphic arts	-	-	-	-	-	-	1	-	-	-	-	-	-	-	1
Metals	-	-	-	1	7	-	-	4	-	3	-	-	-	3	18
Plastics	-	-	-	-	-	-	1	-	-	-	-	-	-	-	1
Automechanics	1	2	1	2	2	2	2	2	2	-	-	1	-	-	17
Fluid power	-	-	-	-	-	-	-	1	-	-	-	-	-	-	1
Other	1	1	1	1	-	1	1	1	2	-	-	-	-	-	7
Total	2	5	2	9	19	3	9	12	6	5	-	2	-	3	79

Table 11 (Continued)

Area	No answer	Less than 6000	6001 - 7000	7001 - 8000	8001 - 9000	9001 - 10000	10001 - 11000	11001 - 12000	12001 - 13000	13001 - 14000	14001 - 15000	15001 - 16000	16001 - 17000	20001 - 21000	Total
Instruction (continued)															
Non-industrial laboratory															
Professional subjects	-	-	-	-	-	-	1	-	-	1	-	-	-	-	2
Related subjects	-	-	-	-	1	-	1	1	-	1	-	-	-	-	4
Guidance and/or counseling	-	-	-	-	-	-	2	-	-	-	-	-	-	-	2
Other	-	-	-	-	4	2	2	2	1	-	1	-	-	-	12
Total	-	-	-	-	5	2	6	3	1	2	1	-	-	-	20
Administration															
Principal	-	-	-	-	-	-	-	-	-	-	1	-	-	-	1
Supervisor	-	-	-	-	-	-	-	-	1	-	-	-	-	-	1
Superintendent	-	-	-	-	-	-	-	-	-	1	-	-	-	-	1
Director	-	-	-	-	-	-	-	1	-	-	-	-	-	1	2
Business administrator	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0
Coordinator	-	-	-	-	1	2	1	1	1	3	-	-	-	-	9
Buildings and grounds	-	-	-	1	-	-	-	-	-	-	-	-	1	-	2
Other	-	-	1	-	-	-	-	1	-	-	-	-	-	-	2
Total	-	-	1	1	1	2	1	3	2	4	1	-	1	1	18

Table 12. Geographic location of education occupational classification

Area	Number	Percentage
Northeast	1	.9
South	3	2.7
Midwest	97	85.8
Southwest	10	8.8
Northwest	2	1.8
Out of country	-	-
Total	113	100.0

Table 13. Geographic location by student population of institution where employed

School population	Northeast	South	Midwest	Southwest	Northwest	Out of country	Total N	Total %
1 - 50	-	-	2	-	-	-	2	1.8
51 - 100	-	-	1	-	-	-	1	.9
101 - 200	-	-	4	-	-	-	4	3.5
201 - 500	-	-	22	-	-	-	22	19.5
501 - 1000	1	-	26	-	-	-	27	23.9
1001 - 2500	-	1	26	7	2	-	36	31.9
Over 2500	-	2	11	2	-	-	15	13.2
No answer	-	-	-	-	-	-	6	5.3
Total	1	3	92	9	2	-	113	100.0
Percent	.9	2.7	81.3	8.0	1.8			

Table 14. Geographic location by education occupational groups

Area	Northeast	South	Midwest	Southwest	Northeast	Out of country	Total
College	-	1	9	2	-	-	12
Senior high school	1	1	50	4	2	-	58
Junior high school	-	-	21	4	-	1	26
Elementary	-	-	-	-	-	-	-
Handicapped	-	1	3	-	-	-	4
Vocational	-	-	11	-	-	-	11
Other	-	-	2	-	-	-	2
Total	1	3	96	10	2	1	113
Percent	.9	2.7	84.9	8.8	1.8	.9	100.0

Table 15. Geographic location by teaching areas of work

Teaching area	Northeast	South	Midwest	Southwest	Northwest	Out of country	Total N	Total %
Multifield industrial laboratory instruction	1	-	15	-	-	-	16	8.0
Singlefield industrial laboratory instruction	2	3	64	9	1	-	79	37.0
Area unit industrial laboratory instruction	-	3	65	10	1	-	79	37.0
Non-area unit industrial laboratory instruction	-	-	18	2	-	-	20	9.0
Administration	-	1	17	-	-	-	18	9.0
Total	3	7	179	21	2	-	212	
Percent	1.0	3.0	85.0	10.0	1.0	-		100.0

Table 16. Geographic location by specific areas of work--singlefield industrial laboratory instruction

Specific area of work	Northeast	South	Midwest	Southwest	Northwest	Out of country	Total
General drafting	1	-	13	3	-	-	17
General electricity	-	1	8	2	1	-	12
General graphic arts	-	-	1	-	-	-	1
General metals	-	1	12	2	-	-	15
General plastics	-	-	3	1	-	-	4
General power	-	-	11	-	-	-	11
General wood	1	1	16	1	-	-	19
Total	2	3	64	9	1	-	79
Percent	2.6	3.8	81.1	11.2	1.3	-	100.0

Table 17. Geographic location of teaching specific areas of work--area unit industrial laboratory instruction

Specific areas of work	Northeast	South	Midwest	Southwest	Northwest	Out of country	Total
Drafting (mechanical)	-	-	9	3	-	-	12
Drafting (architectural)	-	-	2	-	-	-	2
Electricity-electronics	-	-	17	1	-	-	18
Graphic arts	-	-	1	-	-	-	1
Foundry	-	1	4	-	-	-	5
Machine metals	-	1	4	-	-	-	5
Sheet metal	-	-	2	-	-	-	2
Metallurgy	-	-	1	-	-	-	1
Plastics	-	-	2	1	-	-	3
Welding	-	1	4	-	-	-	5
Automechanics	-	-	14	2	1	-	17
Fluid power	-	-	1	-	-	-	1
Other	-	-	4	3	-	-	7
Total	-	3	65	10	1	-	79
Percent	-	3.8	82.3	12.6	1.3	-	100.0

Table 18. Geographic location by teaching specific areas of work--non-industrial laboratory instruction

Specific area of work	Northeast	South	Midwest	Southwest	Northwest	Out of country	Total
Professional subjects	-	-	2	-	-	-	2
Related subjects	-	-	4	-	-	-	4
Guidance and/or counseling	-	-	2	-	-	-	2
Other	-	-	10	2	-	-	12
Total	-	-	18	2	-	-	20
Percent	-	-	90.0	10.0	-	-	100.0

Table 19. Geographic location by teaching specific areas of work--administration

Specific area of work	Northeast	South	Midwest	Southwest	Northwest	Out of country	Total
Principal	-	-	1	-	-	-	1
Supervisor	-	-	1	-	-	-	1
Superintendent	-	-	1	-	-	-	1
Director	-	1	1	-	-	-	2
Business administrator	-	-	-	-	-	-	-
Coordinator	-	-	9	-	-	-	9
Buildings and grounds supervisor	-	-	2	-	-	-	2
Other	-	-	2	-	-	-	2
Total	-	1	17	-	-	-	18
Percent	-	6.0	94.0	-	-	-	100.0

Table 20. Geographic location of industry occupational group

Area	Number	Percentage
Northeast	6	4.4
South	6	4.4
Midwest	94	69.8
Southwest	25	18.6
Northwest	2	1.4
Out of country	2	1.4
Total	135	100.0
Iowa only	47	34.8

The occupational groups for industry employed, the frequency for each, and the percentage for each are listed in Table 21.

Table 21. Industry occupational group

Occupation	Number	Percentage
Industrial engineering	38	28.1
Personnel and/or training administration	36	26.7
Sales and distribution	24	17.8
Purchasing	3	2.2
Public relations	2	1.4
Budgeting	1	.8
Other	27	20.1
No answer	4	2.9
Total	135	100.0

Industrial engineering, personnel and/ or training administration, and sales are the three with the highest number of responses; with 39.0 percent, 36.0 percent, and 24.0 percent respectively. The 'other' in this grouping was indicated by 20.0 percent. A space was provided for a specific response

when the 'other' group was selected. In addition, opportunity was provided for the individual to list his job title and to describe his position. From those three sources, information for Table 22 was acquired.

Table 22. List of positions not categorized by respondents

Engineer	Auditor
Sales	Insurance claims handler
Systems research	Bank executive
Safety	Program manager
Design	Loan officer
Specialist	Safety consultant
Staff	Artillery officer
Employee development	Computer technician
Pilot	Computer programmer
Military	Assembler
Corporate	Production machinist
Supervisor	Producer of motion pictures
Of telephone traffic	

One position was described in more detail than the rest. The response read, "well trained, highly skilled, professional killer, who's profession is peace."

The questionnaire entry which was to solicit information relative to area of work listed the areas found in Table 23. Supervising was the most common work area indicated, followed by managing and service. The 'other' category was followed by a space and a request for an explanation if the category was checked. The following other major responsibilities were reported; auditing, flying, engineering, assembling, analyzing (cost), designing products, interviewing, film making, drafting, operating a lathe, and redesigning products.

Table 24 reveals the frequency of industry-employed graduates in various salary ranges. More than two-thirds, 68.0 percent, reported salaries between

$9,001 and $13,000. The median was computed without those who reported salaries of less than $6,000. A further breakdown of salaries has been completed on Table 25.

The data in Table 26 disclose some deviations from the mean employment within geographic regions. Of those who indicated the 'industrial engineering' classification, 31, or 82.0 percent, were in the Midwest. Those of the Midwest who indicated 'personnel and/or training administration' number 29, or 81.0 percent. There were 27 'other'; 12, or 44.0 percent, were in the Midwest, and 11, 41.0 percent, were in the Southwest.

Within Table 27 there appear no extreme deviations among the industry areas of work.

Table 28 reveals frequency and percentage of graduates at various-size firms. The data presented reveal that just over half, 52.6 percent, indicated that they are employed by companies with fewer than 1000 employees at that location. It appears that slightly less than half, 45.2 percent, are employed at firms employing more than 1000.

Table 23. Area of work in industry

Area of work	Number	Percentage
Supervising	32	23.8
Managing	21	15.5
Service	17	12.7
Materials analysis (research and development)	15	11.1
Sales	11	8.1
Training	10	7.4
Promotion	3	2.2
Purchasing	3	2.2
Writing	2	1.4
Other	17	12.7
No answer	4	2.9
Total	135	100.0

Table 24. Reported annual salary of industry employed

Salary	Number
Less than $6000	4
6001 - 7000	4
7001 - 8000	6
8001 - 9000	8
9001 - 10000	22
10001 - 11000	15
11001 - 12000	16
12001 - 13000	15
13001 - 14000	9
14001 - 15000	8
15001 - 16000	7
16001 - 17000	4
17001 - 18000	1
18001 - 19000	-
19001 - 20000	1
20001 - 21000	-
21001 - 22000	1
22001 - 25000	-
No answer	13
Total	135
Median, $11,250	

Table 25. Salary by industrial occupational classification

Salary	Industrial Engineering	Budgeting	Purchasing	Sales	Public relations	Personnel	Other	Total
Less than $6000	-	-	-	1	-	1	1	4
6001 - 7000	1	-	-	-	-	1	2	4
7001 - 8000	3	-	-	-	-	1	1	5
8001 - 9000	2	-	-	3	-	1	-	6
9001 - 10000	6	1	2	2	-	6	5	22
10001 - 11000	5	-	-	3	1	4	2	15
11001 - 12000	4	-	1	2	1	3	5	16
12001 - 13000	5	-	-	3	-	3	4	15
13001 - 14000	2	-	-	3	-	2	1	8
14001 - 15000	3	-	-	2	-	2	1	8
15001 - 16000	3	-	-	1	-	3	-	7
16001 - 17000	-	-	-	1	-	3	-	4
17001 - 18000	-	-	-	-	-	-	1	1
18001 - 19000	-	-	-	-	-	-	-	-
19001 - 20000	-	-	-	1	-	-	1	2
20001 - 21000	-	-	-	-	-	-	-	-
21001 - 22000	1	-	-	-	-	-	-	1
No answer for salary	4	-	-	2	-	5	3	14
Total	39	1	3	24	2	36	27	132
No answer for occupation								3
								135

Table 26. Geographic location of industry occupational classifications

Occupation	Northeast	South	Midwest	Southwest	Northwest	Out of country	Total N	Total %
Industrial engineering	2	-	31	5	-	-	38	28.1
Personnel and/or training administration	2	-	29	4	1	-	36	26.7
Sales and distribution	2	3	16	3	-	-	24	17.8
Purchasing	-	-	2	1	-	-	3	2.2
Public relations	-	1	1	-	-	-	2	1.4
Budgeting	-	-	1	-	-	-	1	.8
Other	-	2	12	11	1	1	27	20.3
No answer	-	-	2	1	-	1	4	2.9
Total	6	6	94	25	2	2	135	
Percent	4.4	4.4	69.8	18.6	1.4	1.4		100.0

Table 27. Geographic locations of industry areas of work

Occupation	Northeast	South	Midwest	Southwest	Northwest	Out of country	Total N	Total %
Supervising	2	-	25	4	1	-	32	23.8
Managing	2	2	15	2	-	-	21	15.5
Service	1	1	13	2	-	-	17	12.7
Materials analysis (research and development)	-	-	11	4	-	-	15	11.1
Sales	-	1	8	2	-	-	11	8.1
Training	-	-	8	2	-	-	10	7.4
Promotion	-	-	-	3	-	-	3	2.2
Purchasing	-	-	3	-	-	-	3	2.2
Writing	-	-	-	2	-	-	2	1.4
Other	1	2	9	3	1	1	17	12.7
No answers	-	-	2	1	-	-	4	2.9
Total	6	6	94	25	2	2	135	
Percent	4.4	4.4	69.8	18.6	1.4	1.4		100.0

Table 28. Size of firm at respondent's location

Number of employees	Number	Percentage
1 - 20	15	11.1
21 - 50	10	7.4
51 - 100	5	3.7
101 - 250	14	10.4
251 - 500	15	11.1
501 - 1000	12	8.9
over 1000	61	45.2
No answer	3	2.2
Total	135	100.0

In replying to the question, "What is the nature of this firm or company?", 81 of the graduates listed manufacturing. A complete list of the type of organization with which the graduates claim employment follows in Table 29.

Table 29. Types of firms employing graduates

Manufacturing	
Insurance	Military
Banking	Transportation
Brokerage	Communication
Auditing	Research
Processing	Rehabilitation
Retail	Steel fabrication
Construction	Mining

Many of the respondents also listed the product associated with their employing organization. Agricultural equipment was the most common product listed. Included were tractors, implements, and parts. Electronic devices was also a frequent reply. Table 30 is an enumeration of the products of the business enterprises employing the graduates.

Table 30. Products of employing firms

Gypsum wallboard	Heating and air conditioning devices	Appliances and hardware
Agricultural equipment	Automobiles	Business forms (paper)
Packaging equipment	Rubber products	Precision cast parts
Electronic devices	Business equipment	Plastics
Folding cartons	Confectionaries	Machinery
Automatic control valves	Electric insulation	Pharmaceuticals
Cement	Steel	Painting equipment
Furniture	Electrical equipment	Fasteners
Water systems	Fertilizer	Bearings
Construction equipment	Engine governors	Candy
Recreation vehicles	Computers	Milk products
Cereals		Mobile and modular homes

Importance Placed on Course Content

In the General Catalog of Iowa State University, the curriculum for industrial education is divided into three major categories. These are: General Education, Industrial Education Core, and Options. Within each major division there are courses listed. A digest of the descriptions of the courses was made and included as a major portion of the questionnaire.

Table 31a is a listing of the general education course content digests as they were included on the questionnaires, and the courses to which they refer, as they were found in the 1969 - 1971 General Catalog (13).

Table 31b is a listing of the industrial education course content digests as they were included in the questionnaire and the courses to which they refer as they were found in the 1969 - 1971 General Catalog (13).

The digests were rated on the questionnaire. The evaluations for all course content except those professional courses commonly referred to as teaching methods were made with a four-point rating scale.

Table 31a. General education course content digests and corresponding courses

Digest	Course Numbers
Physical science and mathematics	
Organic chemistry	Chem. 334, 335, 336
Inorganic chemistry	Chem. 101, 102, 103
Fundamentals of algebra	Math. 101
Fundamentals of trigonometry	Math. 101
Analytic geometry	Math. 110
Calculus	Math. 110
Objectives and procedures of cost accounting	I. Ad. 371
Principles of statistics	Stat. 201
Application of statistics	Stat. 327
Computer organization	C. S. 214
Computer programming	C. S. 221
Concepts and principles of physics	Phys. 111
Social studies	
Economic principles, problems, and policies	Econ. 241, 242
Structure and organization of trade unions	Econ. 305
Problems, policies, and procedures in contemporary labor relations	Econ. 305
Governmental functions and processes	Pol. S. 215
Fundamental psychological concepts	Psych. 101
Principles of motivation and learning	Psych. 201
Psychological development of the individual	Psych. 230
Application of human learning principles to classroom situations	Psych. 333
Analysis of group, community, and cultural relations	Soc. 134
Biological science	
Organization and function of living systems	Biol. 101
Physiology and anatomy of humans	Zool. 155
Humanities	
Social and cultural development of western man	Hist. 201, 202, 203
Political, economic, and social development of the United States	Hist. 221, 222, 223

Table 31a (Continued)

Digest	Course Numbers
Communicative arts	
Writing as a means to communicate ideas, judgements, observations and other information	Engl. 104, 105, 131, 132 414 Journ. 201, 202, 203
Reading and observation as a source of information	Engl. 104, 105, 201, 205
Principles of oral communications	Sp. 211, 312, 334
Group communications	Sp. 336, I. Ed. 524

The ratings and their descriptions as found on the questionnaire follow:

1. No Value--There is no need for this subject matter in your present employment.

2. Desirable--Some knowledge enables you to perform more effectively but it is not required for the position.

3. Important--Some knowledge is needed to enable you to function in your present position.

4. Essential--A thorough knowledge is needed in carrying out the responsibilities of your present position.

Preceding the rating scale and descriptions were directions which emphasized rating with respect to present position.

The following nine elements were determined to be the major part of the teaching methods courses:

1. Understanding the teacher's role in the profession.
2. Selecting and caring for equipment.
3. Understanding public relations.
4. Determining course content.
5. Developing courses.
6. Planning daily lessons
7. Evaluating student progress.

Table 31b. Industrial education course content digests and corresponding courses

Digest	Course Numbers
Wood	
Wood fabricating techniques	I. Ed. 106, 205, 308
Principles of building construction	I. Ed. 106
Chemical and physical properties of wood	I. Ed. 106
Processing of wood products	I. Ed. 106, 308, 501
Drafting	
Principle elements of mechanical drafting	I. Ed. 121, 122, 123
Fundamentals of freehand drafting	Arch. 334
Architectural drafting conventions and techniques	I. Ed. 324
Spatial geometry (descriptive)	I. Ed. 122
Design principles	I. Ed. 220
Finishing	
Materials, products, processes of finishing	I. Ed. 105
Electricity-electronics	
Direct current circuit analysis	I. Ed. 251
Alternating current circuit analysis	I. Ed. 253
Familiarization with and practical application of modern electronic test equipment	I. Ed. 251, 253, 357, 450
Theory and application of semi-conductor devices	I. Ed. 357
Television theory and service procedure	I. Ed. 450
Electric motor theory and controls	I. Ed. 352
Theory and application of computer circuitry	I. Ed. 357
Metals	
Basic metal casting procedures	I. Ed. 234
Heat treating principles and techniques	I. Ed. 234, 436
Use of metal working tools	I. Ed. 234
Fundamental metal machine operations	I. Ed. 236, 336
Relationship between structure and properties of metals	I. Ed. 234, 436
Principles and practices of sheet metal fabrication	I. Ed. 232
Welding ferrous and nonferrous metals	A. Ed. 359
Fundamentals of metal spinning	I. Ed. 230, 232
Power mechanics	
Sources, development, and application of power	I. Ed. 260, 261
The automobile industry	I. Ed. 262

Table 31b (Continued)

Digest	Course Numbers
Power mechanics (Continued)	
Operating principles of automobile components	I. Ed. 262, 364, 368
Service of automobile components	I. Ed. 361, 364, 368
Principles and application of fluids (hydraulics)	I. Ed. 260
Graphic arts	
Fundamentals of design, finishing, and reproduction of printed materials	No courses offered
Techniques of quantity production of printed materials	No courses offered
Plastics	
Chemical and physical properties of plastic resins	I. Ed. 370
Plastics processing methods	I. Ed. 370
General industrial education	
Industrial education--its place in society	I. Ed. 110
Planning and layout of industrial shops, laboratories, and classroom facilities	I. Ed. 410
Initiating and maintaining effective safety programs	I. Ed. 216, 310 I. E. 421

8. Preparing a budget.
9. Developing competency in the teaching act.[1]

These elements were evaluated with a five-point rating scale with the following ratings and descriptions:

1. Not needed--Elementary element which can be acquired on the job without being detrimental to students.
2. Awareness needed--Just being made aware of this is enough.
3. Desirable--Helpful, but discussion and demonstration should be sufficient.

[1]From a discussion with Gerald Parks, College Supervisor of Student Teaching in Industrial Education, March, 1970.

4. Important--Some understanding is needed and an opportunity to practice should be provided.
5. Essential--Graduates of a teacher-preparation program should have a thorough understanding plus a high level of proficiency in the element.

The directions which preceded that scale read as follows:

> The following elements are all considered to be part of teaching. Please mark in the appropriate column to rank them according to what you think their importance in a teacher preparation program is, using the following number ranking.

For ease of interpretation, the four-point rating scale may be considered as a two-point scale as well. The two ratings 'No value' and 'Desirable' indicate content not needed. The other two ratings, 'Important' and 'Essential', indicate content needed. If a more definitive evaluation is desired, the four points may be considered. If the evaluation is to be less definitive, the two points will serve.

Similarly, in the five-point scale there is also a less-detailed rating possible. The first rating, 'Not needed' is self-explanatory. The next two, 'Awareness needed' and 'Desirable', may be jointly classified as 'Only discussion needed'. The ratings 'Important' and 'Essential' may be considered 'Practice needed'. It is believed that such flexibility within the rating scales may increase the usefulness of the evaluations.

The evaluation of the course content is, with the exception of the optional courses, in the same order as the content digests appeared on the questionnaire, which is the same order as they were found in the General Catalog (13). Optional courses are listed with their respective instructional areas.

Education occupational classifications, groups, and areas of work are presented first. Industry classifications, groups, and areas of work are second. Data presented in the tables included in the following text are

frequency of replies and percent of total replies for each item. The highest percentage is underscored. Only those occupational groups and areas of work with ten or more respondents have evaluations listed in table form. Others are not listed.

Education occupational classification

The data presented in Tables 32 through 38 are the evaluations of all course content by all those who are employed in the major occupational classification, education.

Table 32 reveals that only two content areas are rated 'Essential' by the largest percentage of replies. These are fundamentals of algebra and trigonometry. Calculus, however, is rated by over 51.0 percent to be of 'No value'. Algebra, trigonometry, analytic geometry, and physics are the only content areas of the physical sciences and mathematics groups considered needed by over 50.0 percent of those employed in education.

Table 32. Evaluation of physical science and mathematics course content--by education occupational classification N = 113

Course	Essential N	Essential %	Important N	Important %	Desirable N	Desirable %	No Value N	No Value %
Organic chemistry	1	.9	19	16.8	56	49.4	37	32.9
Inorganic chemistry	7	6.2	26	23.0	53	46.9	27	23.9
Fundamentals of algebra	52	47.1	35	30.9	25	22.1	1	.9
Fundamentals of trigonometry	40	35.4	39	34.5	28	24.8	6	5.3
Analytic geometry	14	12.5	45	39.8	38	33.6	16	14.1
Objectives and procedures of cost accounting	9	8.1	33	29.2	51	45.1	20	17.6
Calculus	4	3.6	15	13.2	36	31.8	58	51.4
Principles of statistics	9	8.0	27	23.9	54	47.7	23	20.4
Application of statistics	7	6.2	28	24.8	51	45.1	27	23.9
Computer organization	4	3.5	17	15.1	56	49.6	36	31.8
Computer programing	4	3.5	23	20.4	47	41.6	39	34.5
Concepts and principles of physics	34	30.0	49	43.4	24	21.3	6	5.3

The social science evaluations which appear on Table 33 disclose a high percent of 'Important' or 'Essential' ratings for psychology and sociology course content, while economics, labor, and government are rated 'Desirable'.

Table 33. Evaluation of social science course content--by education occupational classification N = 113

Course	Essential N	Essential %	Important N	Important %	Desirable N	Desirable %	No Value N	No Value %
Economic principles, problems and policies	9	8.0	35	30.9	58	51.4	11	9.7
Structure and organization of trade unions	14	12.4	37	32.7	54	47.8	8	7.1
Problems, policies and procedures in contemporary labor relations	14	12.4	34	30.0	49	43.4	16	14.2
Governmental functions and processes	18	15.9	40	35.4	44	38.9	12	10.8
Fundamental psychological concepts	39	34.5	49	43.4	20	17.6	5	4.5
Principles of motivation and learning	64	56.6	40	35.4	6	5.3	3	2.7
Psychological development of the individual	52	46.8	44	38.9	14	12.6	3	2.7
Application of human learning principles to classroom situations	65	57.5	30	26.6	16	14.1	2	1.8
Analysis of group, community, and cultural relations	28	24.8	43	38.0	36	31.8	6	5.4

The biological sciences, Table 34, and the humanities, Table 35, were both rated on the low end of the scale by a large percent of respondents.

Table 34. Evaluation of biological science course content--by education occupational classification N = 113

Course	Essential N	Essential %	Important N	Important %	Desirable N	Desirable %	No Value N	No Value %
Organization and function of living systems	3	2.8	17	15.0	62	54.8	31	27.4
Physiology and anatomy of humans	3	2.8	17	15.0	57	50.4	36	31.8

Table 35. Evaluation of humanities course content--by education occupational classification N = 113

Course	Essential N	Essential %	Important N	Important %	Desirable N	Desirable %	No Value N	No Value %
Social and cultural development of western civilization	6	5.3	14	12.4	65	57.5	28	24.8
Political, economic and social development of the United States	8	7.1	35	30.9	56	49.6	13	11.4

The ratings of the communicative arts, which are reported in Table 36, make it apparent that this area is believed, by a large percent of the graduates, to be needed in their work. More than 80.0 percent of the replies were either in the 'Essential' or 'Important' category.

Table 36. Evaluation of communicative arts course content—by education occupational classification N = 113

Course	Essential N	Essential %	Important N	Important %	Desirable N	Desirable %	No Value N	No Value %
Writing as a means to communicate ideas, judgements, observations, and other information	63	55.7	38	33.6	7	6.2	4	3.5
Reading and observations as a source of information	63	55.7	37	32.7	9	7.9	3	2.7
Principles of oral communications	80	70.7	24	21.2	7	6.2	1	.9
Group communication problems and practices	67	59.2	32	28.3	10	8.8	3	2.7

Table 37 presents a summary of the values placed on the content within the industrial education core. Examination of this table reveals that very few education-employed graduates rated any industrial education content 'No value'. Conversely, several content areas were rated 'Essential' by 50.0 percent or more. These and their respective percentages are mechanical drafting, 61.1 percent; freehand drafting, 52.3 percent; direct current circuit analysis, 57.6 percent; alternating current circuit analysis, 56.8 percent; familiarization and application of modern electronic test equipment, 52.3 percent; use of metal working tools, 56.7 percent; and fundamental metal machine operations, 56.7 percent.

Table 37. Evaluation of industrial education course content--by education occupational classification N = 113

Course	Essential N	Essential %	Important N	Important %	Desirable N	Desirable %	No Value N	No Value %
Wood area								
Wood fabricating techniques	46	40.8	25	22.1	32	28.3	10	8.8
Principles of building construction	44	38.9	28	24.8	27	23.9	14	12.4
Chemical and physical properties of wood	23	20.5	26	23.0	43	38.0	21	18.5
Processing of wood products	29	25.8	31	27.4	34	30.0	19	16.8
Drafting area								
Principle elements of mechanical drafting	69	61.1	30	26.5	14	12.4	-	
Fundamentals of freehand drafting	59	52.3	34	30.0	18	15.9	2	1.8
Architectural drafting conventions and techniques	43	38.0	33	29.2	29	25.7	8	7.1
Spatial geometry (descriptive)	33	29.2	45	39.8	30	26.6	5	4.4
Design principles	48	42.6	44	38.9	20	17.6	1	.9
Finishing area								
Materials, products, processing of finishing	49	43.4	31	27.4	22	19.5	11	9.7
Electricity-electronics area								
Direct current circuit analysis	65	57.6	23	20.4	21	18.5	4	3.5
Alternating current circuit analysis	64	56.8	25	22.1	10	17.6	4	3.5
Familiarization with and practical application of modern electronic test equipment	59	52.3	25	22.1	20	17.6	9	8.0
Theory and application of semi-conductor devices	42	37.2	28	24.8	27	23.9	16	14.1
Television theory and service procedure	27	24.0	26	23.0	36	31.8	24	21.2
Electric motor theory and controls	39	34.6	36	31.8	27	23.9	11	9.7
Theory and application of computer circuitry	18	16.0	17	15.0	51	45.1	27	23.9

Table 37 (Continued)

Course	Essential N	Essential %	Important N	Important %	Desirable N	Desirable %	No Value N	No Value %
Metals area								
Basic metal casting procedures	39	34.6	34	30.0	28	24.8	12	10.6
Heat treating principles and techniques	42	37.2	34	30.0	23	20.4	14	12.4
Use of metalworking tools	64	56.7	29	25.7	16	14.1	4	3.5
Fundamental metal machine operations	64	56.7	25	22.2	20	17.6	4	3.5
Relationship between structure and properties of metals	33	29.2	39	34.5	30	26.6	11	9.7
Principles and practices of sheet metal fabrication	48	42.6	34	20.0	27	23.9	4	3.5
Welding ferrous and non-ferrous metals	50	44.2	27	23.9	30	26.6	6	5.3
Fundamentals of metal spinning	6	5.3	21	18.5	56	49.6	30	26.6
Power mechanics area								
Sources, development, and application of power	48	42.5	34	30.1	18	15.9	13	11.5
The automobile industry	36	31.8	34	30.2	29	25.7	14	12.3
Operating principles of automobile components	49	43.5	30	26.5	21	18.5	13	11.5
Service of automobile components	48	42.6	26	23.0	21	18.5	18	15.9
Principles and applications of fluids (hydraulics)	27	24.0	36	31.8	39	34.5	11	9.7
Graphic arts area								
Fundamentals of design, finishing, and reproduction of printed materials	23	20.5	34	30.0	38	33.6	18	15.9
Techniques of quantity production of printed materials	16	14.1	30	26.6	45	39.8	22	19.5
Plastics area								
Chemical and physical properties of plastic resins	19	16.9	32	28.3	39	34.5	23	20.3
Plastics processing methods	18	16.0	38	33.6	34	30.1	23	20.3

Table 37 (Continued)

Course	Essential N	Essential %	Important N	Important %	Desirable N	Desirable %	No Value N	No Value %
General area								
Industrial education--its place in society	42	37.2	47	41.6	20	17.7	4	3.5
Planning and layout of industrial shops, laboratories, and classroom facilities	59	52.3	36	31.8	12	10.6	6	5.3
Initiating and maintaining effective safety programs	78	69.1	20	17.7	11	9.7	4	3.5

Data contained in Table 38 reveal the value of the elements of methods of teaching reported by those employed in education. The highest percent of replies was in the 'Essential' category in all elements. Developing courses had the highest number of replies in 'Essential', with 87, or 77.0 percent. By combining the percents of the 'Essential' and 'Important' categories, it can be seen that more than 90.0 percent of the respondents thought that practice was needed in the following five areas: 1. Selecting and caring for equipment, 2. Determining course content, 3. Developing courses, 4. Evaluating student progress, 5. Developing competency in the teaching act.

It was thought that a comparison between the replies of the industry employed and those of the education employed might be interesting. However, very few industry-employed respondents completed that section of the questionnaire, so no comparison was made.

Table 38. Evaluation of industrial education course content, methods of teaching--by education occupational classification N = 113

	Essential		Important		Desirable		Awareness needed		Not needed	
	N	%	N	%	N	%	N	%		%
Understanding the teacher's role in the profession	62	54.9	27	23.9	19	16.8	4	3.5	1	.9
Selecting and caring for equipment	73	64.6	32	28.3	7	6.2	1	.9	-	
Understanding public relations	55	48.8	45	39.8	12	10.6	1	.9	1	.9
Determining course content	84	74.3	25	22.1	2	1.8	2	1.8	-	
Developing courses	87	77.0	19	16.8	4	3.5	2	1.8	1	.9
Planning daily lessons	60	44.2	36	31.8	13	11.5	4	3.5	-	
Evaluating student progress	77	68.1	27	23.9	7	6.2	2	1.8	-	
Preparing a budget	43	38.0	43	38.0	22	19.5	3	2.7	2	1.8
Developing competency in the teaching act	78	69.0	30	26.5	3	2.7	1	.9	1	.9

Education occupational groups

Of the seven occupational groups which were listed on the questionnaire, four were checked by 10 or more respondents. These were 'College or university', 'Senior high school', 'Junior high school', and 'Vocational-technical.

College or university Persons who reported college or university employment indicated that, for the most part, the physical science and mathematics course content was not needed by them in their work. Only two areas, algebra and physics, were marked in either the 'Essential' or the 'Important' category by more than 50.0 percent. Complete data for the group are presented in Table 39.

Social science content was rated higher with, as can be seen in Table 40, government, psychology, and sociology rated 'Essential' or 'Important' by more than half of the college or university group. Both biological science and humanities had the greatest frequencies in the 'Desirable' category. These data are found in Tables 41 and 42. More than 90.0 percent of this occupational group apparently considered the communicative arts necessary to their positions. Data in Table 43 disclose only one reply in the 'No value' category for the communicative arts.

With very few exceptions, the highest percentages of this group's evaluations were in the 'Desirable' or 'No value' categories. Those exceptions were in the metals, graphic arts, and general industrial education area. The specific frequencies and percents are displayed in Table 44.

As is apparent by Table 45, the two categories 'Not needed' and 'Awareness needed' were not checked by any of the college or university group. Developing competency in the teaching act and developing courses were the two elements with the greatest percent of replies in the 'Essential' category.

Table 39. Evaluation of physical science and mathematics course content--by education occupational group, college or university N = 12

Course	Essential N	Essential %	Important N	Important %	Desirable N	Desirable %	No Value N	No Value %
Organic chemistry	-		2	17	7	58	3	25
Inorganic chemistry	-		4	34	5	41	3	25
Fundamentals of algebra	4	33	3	25	4	33	1	9
Fundamentals of trigonometry	3	25	3	25	3	25	3	25
Analytic geometry	2	17	3	25	4	33	3	25
Objectives and procedures of cost accounting	-		5	41	5	41	2	18
Calculus	-		3	25	3	25	6	50
Principles of statistics	4	34	1	8	6	50	1	8
Application of statistics	3	25	2	17	5	41	2	17
Computer organization	-		4	34	5	41	3	25
Computer programing	1	9	5	41	4	33	2	17
Concepts and principles of physics	4	33	3	25	3	25	2	17

Table 40. Evaluation of social science course content--by education occupational group, college or university N = 12

Course	Essential N	Essential %	Important N	Important %	Desirable N	Desirable %	No Value N	No Value %
Economic principles, problems and policies	-		5	41	5	41	2	18
Structure and organization of trade unions	1	9	1	9	8	64	2	17
Problems, policies and procedures in contemporary labor relations	1	9	5	41	4	33	2	17
Governmental functions and processes	4	33	3	25	5	42	-	
Fundamental psychological concepts	6	50	3	25	3	25	-	
Principles of motivation and learning	6	50	5	41	1	9	-	
Psychological development of the individual	6	50	5	41	1	9	-	
Application of human learning principles to classroom situations	7	57	3	25	2	17	-	
Analysis of group, community, and cultural relations	6	50	4	33	-		2	17

Table 41. Evaluation of biological science course content--by education occupational group, college or university N = 12

Course	Essential N	Essential %	Important N	Important %	Desirable N	Desirable %	No Value N	No Value %
Organization and function of living systems	-		3	25	8	66	1	9
Physiology and anatomy of humans	1	9	3	25	7	57	1	9

Table 42. Evaluation of humanities course content--by education occupational group, college or university N = 12

Course	Essential N	Essential %	Important N	Important %	Desirable N	Desirable %	No Value N	No Value %
Social and cultural development of western civilization	-		1	9	8	66	3	25
Political, economic and social development of the United States	-		5	41	6	50	1	9

Table 43. Evaluation of communicative arts course content--by education occupational group, college or university N = 12

Course	Essential N	Essential %	Important N	Important %	Desirable N	Desirable %	No Value N	No Value %
Writing as a means to communicate ideas, judgements, observations, and other information	5	41	6	50	-		1	9
Reading and observations as a source of information	6	50	5	41	1	9	-	
Principles of oral communications	11	91	1	9	-		-	
Group communication problems and practices	9	73	3	27	-		-	

Table 44. Evaluation of industrial education course content--by education occupational group, college or university N = 12

Course	Essential N	Essential %	Important N	Important %	Desirable N	Desirable %	No Value N	No Value %
Wood area								
Wood fabricating techniques	1	9	-		8	66	3	25
Principles of building construction	1	9	2	17	5	41	4	33
Chemical and physical properties of wood	1	9	-		7	58	4	33
Processing of wood products	1	9	1	9	6	50	4	32
Drafting area								
Principle elements of mechanical drafting	3	25	4	33	5	42	-	
Fundamentals of freehand drafting	3	25	4	33	5	42	-	
Architectural drafting conventions and techniques	1	9	2	17	7	57	2	17
Spatial geometry (descriptive)	3	25	3	25	5	41	1	9
Design principles	3	25	5	41	4	34	-	
Finishing area								
Materials, products, processing of finishing	3	25	1	9	6	50	2	16
Electricity-electronics area								
Direct current circuit analysis	4	33	1	9	5	41	2	17
Alternating current circuit analysis	4	33	1	9	5	41	2	17
Familiarization with and practical application of modern electronic test equipment	4	32	1	9	1	9	6	50
Theory and application of semi-conductor devices	3	25	1	9	2	16	6	50
Television theory and service procedure	3	25	-		1	9	8	67
Electric motor theory and controls	2	17	2	17	3	25	5	41
Theory and application of computer circuitry	1	9	1	9	3	25	7	57

Table 44 (Continued)

Course	Essential N	Essential %	Important N	Important %	Desirable N	Desirable %	No Value N	No Value %
Metals area								
Basic metal casting procedures	3	25	1	8	5	42	3	25
Heat treating principles and techniques	3	25	2	17	2	17	5	41
Use of metalworking tools	5	42	1	8	4	33	2	17
Fundamental metal machine operations	5	42	1	8	4	33	2	17
Relationship between structure and properties of metals	4	33	1	8	2	17	5	42
Principles and practices of sheet metal fabrication	1	8	1	8	9	76	1	8
Welding ferrous and non-ferrous metals	1	8	2	17	7	58	2	17
Fundamentals of metal spinning	-		1	8	7	59	4	33
Power mechanics area								
Sources, development, and application of power	2	17	3	25	2	17	5	41
The automobile industry	2	17	3	25	2	17	5	41
Operating principles of automobile components	3	25	2	17	2	17	5	41
Service of automobile components	3	25	2	16	1	9	6	50
Principles and applications of fluids (hydraulics)	3	25	4	33	2	17	3	25
Graphic arts area								
Fundamentals of design, finishing, and reproduction of printed materials	1	9	5	41	4	33	2	17
Techniques of quantity production of printed materials	1	9	5	41	3	25	3	25
Plastics area								
Chemical and physical properties of plastic resins	2	16	1	9	3	25	6	50
Plastics processing methods	2	17	1	9	4	33	5	41

Table 44 (Continued)

Course	Essential N	Essential %	Important N	Important %	Desirable N	Desirable %	No Value N	No Value %
General area								
Industrial education--its place in society	5	42	4	33	3	25	-	
Planning and layout of industrial shops, laboratories, and classroom facilities	4	33	3	25	2	17	3	25
Initiating and maintaining effective safety programs	3	25	2	17	5	41	2	17

Senior high school The greatest frequency of replies occurred in this occupational group. There were 58 graduates who classified their occupation as senior high school.

Algebra, trigonometry, and physics are the three physical science and mathematics course-content areas reported to be needed in the performance of job-oriented activities by the high-school group. The percents disclosed by Table 46 are 77.0, 80.0, and 74.0 respectively. Only one content area, principles of statistics, has the major percent of replies in the 'No value' category. The data presented in Table 47 make it apparent that psychological concepts and principles were rated either 'Essential' or 'Important' by a major number of respondents.

The senior high school group indicated little need for the biological sciences in their employment, as it evident by the frequencies contained in Table 48. The humanities, Table 49, were rated in a similar manner.

The data which are reported in Table 50, however, present a different pattern. The communicative arts were apparently of greater need in the classroom.

Table 45. Evaluation of industrial education course content, methods of teaching--by education occupational group, college or university N = 12

	Essential N	Essential %	Important N	Important %	Desirable N	Desirable %	Awareness needed N	Awareness needed %	Not needed N	Not needed %
Understanding the teacher's role in the profession	7	58	3	25	2	17	-		-	
Selecting and caring for equipment	6	50	4	33	2	17	-		-	
Understanding public relations	7	57	3	25	2	17	-		-	
Determining course content	8	67	4	33	-		-		-	
Developing courses	9	75	3	25	-		-		-	
Planning daily lessons	8	67	4	33	-		-		-	
Evaluating student progress	8	67	4	33	-		-		-	
Preparing a budget	4	33	5	42	3	25	-		-	
Developing competency in the teaching act	9	79	3	25	-		-		-	

It can be discovered by perusing the data contained in Table 51 that the graduates who were employed in high schools indicated a large number of content areas to be necessary to their occupation. As can be seen, mechanical drafting, electricity-electronics, metals, power, and general industrial education all had a high frequency of replies in the category 'Essential'. No content area was reported of 'No value' by more than 19.0 percent. The summary of data found in Table 52 reveals that the elements of selecting and caring for equipment, determining course content, developing courses, and developing competency in the teaching act were all rated 'Essential' by a large percentage of graduates. Interestingly, two of these elements, developing courses, and developing competency in the teaching act, were rated by one respondent 'Not needed' in a teacher-preparation program.

Table 46. Evaluation of physical science and mathematics course content--by education occupational group, senior high school N = 58

Course	Essential N	Essential %	Important N	Important %	Desirable N	Desirable %	No Value N	No Value %
Organic chemistry	1	2	10	17	33	57	14	24
Inorganic chemistry	6	10	9	15	30	52	13	23
Fundamentals of algebra	31	53	14	24	13	23	-	
Fundamentals of trigonometry	23	40	23	40	11	18	1	2
Analytic geometry	9	15	21	36	22	39	6	10
Objectives and procedures of cost accounting	4	7	17	30	27	46	10	17
Calculus	2	3	8	14	21	37	27	46
Principles of statistics	5	9	11	19	31	54	11	19
Application of statistics	4	7	10	17	29	50	15	26
Computer organization	3	5	9	15	29	50	17	30
Computer programing	2	3	11	19	26	45	19	33
Concepts and principles of physics	19	33	24	41	13	23	2	3

Table 47. Evaluation of social science course content--by education occupational group, senior high school N = 58

Course	Essential N	Essential %	Important N	Important %	Desirable N	Desirable %	No Value N	No Value %
Economic principles, problems and policies	4	7	18	31	32	55	4	7
Structure and organization of trade unions	7	12	22	38	25	43	4	7
Problems, policies and procedures in contemporary labor relations	6	10	17	30	26	45	9	15
Governmental functions and processes	8	14	23	40	21	36	6	10
Fundamental psychological concepts	18	31	29	50	9	15	2	3
Principles of motivation and learning	30	52	23	40	4	6	1	2
Psychological development of the individual	27	46	22	38	8	14	1	2
Application of human learning principles to classroom situations	32	56	16	27	9	15	1	2
Analysis of group, community, and cultural relations	11	19	21	36	24	42	2	3

Table 48. Evaluation of biological science course content--by education occupational group, senior high school N = 58

Course	Essential N	Essential %	Important N	Important %	Desirable N	Desirable %	No Value N	No Value %
Organization and function of living systems	1	2	10	17	29	50	18	31
Physiology and anatomy of humans	1	2	6	10	32	56	19	32

Table 49. Evaluation of humanities course content--by education occupational group, senior high school N = 58

Course	Essential N	Essential %	Important N	Important %	Desirable N	Desirable %	No Value N	No Value %
Social and cultural development of western civilization	4	7	8	14	32	56	14	23
Political, economic and social development of the United States	4	7	20	34	29	50	5	9

Table 50. Evaluation of communicative arts course content--by education occupational group, senior high school N = 58

Course	Essential N	Essential %	Important N	Important %	Desirable N	Desirable %	No Value N	No Value %
Writing as a means to communicate ideas, judgements, observations, and other information	33	57	19	33	4	7	2	3
Reading and observations as a source of information	33	57	19	33	4	7	2	3
Principles of oral communications	41	71	11	19	5	8	1	2
Group communication problems and practices	34	59	15	26	8	13	1	2

Table 51. Evaluation of industrial education course content--by education occupational group, senior high school N = 58

Course	Essential N	Essential %	Important N	Important %	Desirable N	Desirable %	No Value N	No Value %
Wood area								
Wood fabricating techniques	24	41	15	26	17	30	2	3
Principles of building construction	24	41	14	24	14	24	6	11
Chemical and physical properties of wood	14	24	12	21	22	38	10	17
Processing of wood products	14	24	16	28	20	34	8	14
Drafting area								
Principle elements of mechanical drafting	38	66	16	28	4	6	-	
Fundamentals of freehand drafting	32	56	17	30	7	12	2	2
Architectural drafting conventions and techniques	27	46	18	31	10	17	3	6
Spatial geometry (descriptive)	19	33	23	40	14	24	2	3
Design principles	28	48	21	36	9	16	-	
Finishing area								
Materials, products, processing of finishing	28	48	16	28	10	17	4	7
Electricity-electronics area								
Direct current circuit analysis	41	71	7	12	8	14	2	3
Alternating current circuit analysis	40	69	9	15	7	13	2	3
Familiarization with and practical application of modern electronic test equipment	39	68	8	14	9	15	2	3
Theory and application of semi-conductor devices	24	41	16	28	14	24	4	7
Television theory and service procedure	17	30	13	23	21	35	7	12
Electric motor theory and controls	26	45	16	28	14	24	2	3
Theory and application of computer circuitry	11	20	9	15	29	50	9	15

Table 51 (Continued)

Course	Essential N	Essential %	Important N	Important %	Desirable N	Desirable %	No Value N	No Value %
Metals area								
Basic metal casting procedures	25	43	17	30	13	22	3	5
Heat treating principles and techniques	28	48	19	33	7	12	4	7
Use of metalworking tools	42	72	12	21	2	3	2	3
Fundamental metal machine operations	40	69	12	21	4	7	2	3
Relationship between structure and properties of metals	20	34	21	36	13	23	4	7
Principles and practices of sheet metal fabrication	32	56	16	27	8	14	2	3
Welding ferrous and non-ferrous metals	37	64	11	19	9	15	1	2
Fundamentals of metal spinning	2	3	14	24	31	54	11	19
Power mechanics area								
Sources, development, and application of power	30	52	15	26	9	15	4	7
The automobile industry	27	46	17	30	10	17	4	7
Operating principles of automobile components	34	59	15	26	6	10	3	5
Service of automobile components	34	59	14	24	6	10	4	7
Principles and applications of fluids (hydraulics)	17	30	21	36	16	27	4	7
Graphic arts area								
Fundamentals of design, finishing, and reproduction of printed materials	14	24	13	23	22	38	9	15
Techniques of quantity production of printed materials	9	15	14	24	25	44	10	17
Plastics area								
Chemical and physical properties of plastic resins	9	15	17	30	23	40	9	15
Plastics processing methods	8	14	20	34	20	34	10	18

Table 51 (continued)

Course	Essential N	Essential %	Important N	Important %	Desirable N	Desirable %	No Value N	No Value %
General area								
Industrial education--its place in society	23	40	24	42	9	15	2	3
Planning and layout of industrial shops, laboratories, and classroom facilities	33	57	17	29	7	12	1	2
Initiating and maintaining effective safety programs	45	78	9	15	3	5	1	2

Junior high school Very few of the junior high school occupational classification rated course content in the physical science and mathematics classification 'Essential'. In fact, in Table 53 there are six content areas listed with no 'Essential' ratings. On the other end of the scale, there are several of the highest percentages in the 'No value' column--calculus was rated by 76.0 percent 'No value'. Most junior high school respondents rated the content of physical science and mathematics either 'Important' or 'Desirable'.

Of the social sciences, psychological concepts and principles appear conspicuous with high frequencies in the 'Essential' category. The remainder of the content areas listed in Table 54 were rated 'Important' and 'Desirable' by the greatest percent of those who replies. The data contained on Tables 55 and 56 do not vary appreciably from those reported for the other occupational groups. Table 57 contains the data for the communicative arts content area. Many members of the junior high school group marked the 'Essential' category when they evaluated these areas.

Table 52. Evaluation of industrial education course content, methods of teaching--by education occupational group, senior high school N = 58

	Essential N	Essential %	Important N	Important %	Desirable N	Desirable %	Awareness needed N	Awareness needed %	Not needed N	Not needed %
Understanding the teacher's role in the profession	31	54	15	26	10	17	2	3	-	
Selecting and caring for equipment	41	70	16	28	1	2	-		-	
Understanding public relations	29	50	25	43	4	7	-		-	
Determining course content	46	80	11	18	1	2	-		-	
Developing courses	46	80	9	15	2	3	-		1	2
Planning daily lessons	30	52	19	33	6	10	3	5	-	
Evaluating student progress	39	67	15	26	3	5	1	2	-	
Preparing a budget	24	42	28	48	6	10	-		-	
Developing competency in the teaching act	41	71	14	24	2	3	-		1	2

Most of the large reply percentages are found in the 'Important' category in Table 58. The frequencies found in the 'No value' columns are generally low. Only one content area, initiating and maintaining effective safety programs, has a large percent of 'Essential' replies. There were 80.0 percent who rated that as 'Essential'.

Data found in Table 59 reveal that the elements of methods of teaching were rated 'Essential' by the largest percent of respondents.

Table 53. Evaluation of physical science and mathematics course content--by education occupational group, junior high school N = 25

Course	Essential N	Essential %	Important N	Important %	Desirable N	Desirable %	No Value N	No Value %
Organic chemistry	-		5	20	11	44	9	36
Inorganic chemistry	1	4	6	24	9	36	9	36
Fundamentals of algebra	7	28	13	52	5	20	-	
Fundamentals of trigonometry	5	20	9	36	9	36	2	8
Analytic geometry	1	4	10	40	10	40	4	16
Objectives and procedures of cost accounting	4	16	6	24	11	44	4	16
Calculus	-		1	4	5	20	19	76
Principles of statistics	-		11	44	7	28	7	28
Application of statistics	-		12	48	6	24	7	28
Computer organization	-		1	4	12	48	12	48
Computer programing	-		2	8	10	40	13	52
Concepts and principles of physics	5	20	11	44	7	28	2	8

Table 54. Evaluation of social science course content--by education occupational group, junior high school N = 25

Course	Essential N	Essential %	Important N	Important %	Desirable N	Desirable %	No Value N	No Value %
Economic principles, problems and policies	5	20	9	36	7	28	4	16
Structure and organization of trade unions	2	8	9	36	12	48	2	8
Problems, policies and procedures in contemporary labor relations	2	8	9	36	9	36	5	20
Governmental functions and processes	4	16	7	28	10	40	4	16
Fundamental psychological concepts	9	36	11	44	3	12	2	8
Principles of motivation and learning	15	60	8	32	1	4	1	4
Psychological development of the individual	11	44	11	44	2	8	1	4
Application of human learning principles ot classroom situations	15	60	6	24	3	12	1	4
Analysis of group, community, and cultural relations	9	36	10	40	4	16	2	8

Table 55. Evaluation of biological science course content--by education occupational group, junior high school N = 25

Course	Essential N	Essential %	Important N	Important %	Desirable N	Desirable %	No Value N	No Value %
Organization and function of living systems	2	8	4	16	12	48	7	28
Physiology and anatomy of humans	1	4	7	28	8	32	9	36

Table 56. Evaluation of humanities course content--by education occupational group, junior high school N = 25

Course	Essential N	Essential %	Important N	Important %	Desirable N	Desirable %	No Value N	No Value %
Social and cultural development of western civilization	2	8	4	16	13	52	6	24
Political, economic and social development of the United States	2	8	8	32	8	32	7	28

Table 57. Evaluation of communicative arts course content--by education occupational group, junior high school N = 25

Course	Essential N	Essential %	Important N	Important %	Desirable N	Desirable %	No Value N	No Value %
Writing as a means to communicate ideas, judgements, observations, and other information	15	60	6	24	3	12	1	4
Reading and observations as a source of information	16	64	5	20	3	12	1	4
Principles of oral communications	18	72	5	20	2	8	-	
Group communication problems and practices	12	48	10	40	1	4	2	8

Table 58. Evaluation of industrial education course content--by education occupational group, junior high school N = 25

Course	Essential N	Essential %	Important N	Important %	Desirable N	Desirable %	No Value N	No Value %
Wood area								
Wood fabricating techniques	14	56	9	36	1	4	1	4
Principles of building construction	12	48	9	36	4	16	-	
Chemical and physical properties of wood	7	28	12	48	4	16	2	8
Processing of wood products	10	40	11	44	3	12	1	4
Drafting area								
Principle elements of mechanical drafting	19	76	6	24	-		-	
Fundamentals of freehand drafting	16	64	6	24	3	12	-	
Architectural drafting conventions and techniques	9	36	11	44	5	20	-	
Spatial geometry (descriptive)	7	28	11	44	7	28	-	
Design principles	12	48	9	36	4	16	-	
Finishing area								
Materials, products, processing of finishing	13	52	9	36	2	96	1	4
Electricity-electronics area								
Direct current circuit analysis	10	40	11	44	4	16	-	
Alternating current circuit analysis	10	40	10	40	5	20	-	
Familiarization with and practical application of modern electronic test equipment	9	36	9	36	6	24	1	4
Theory and application of semi-conductor devices	8	32	6	24	7	28	4	16
Television theory and service procedure	4	16	6	24	9	36	6	24
Electric motor theory and controls	7	28	10	40	5	20	3	12
Theory and application of computer circuitry	2	8	5	20	11	44	7	28

Table 58 (Continued)

Course	Essential N	Essential %	Important N	Important %	Desirable N	Desirable %	No Value N	No Value %
Metals area								
Basic metal casting procedures	7	28	12	48	5	20	1	4
Heat treating principles and techniques	6	24	11	44	7	28	1	4
Use of metalworking tools	12	48	8	32	5	20	-	
Fundamental metal machine operations	11	44	7	28	7	28	-	
Relationship between structure and properties of metals	7	28	8	32	9	36	1	4
Principles and practices of sheet metal fabrication	11	44	6	24	7	28	1	4
Welding ferrous and non-ferrous metals	6	24	8	32	10	40	1	4
Fundamentals of metal spinning	3	12	4	16	13	52	5	20
Power mechanics area								
Sources, development, and application of power	11	44	9	36	4	16	1	4
The automobile industry	3	12	12	48	8	32	2	8
Operating principles of automobile components	6	24	9	36	8	32	2	8
Service of automobile components	5	20	7	28	11	44	2	8
Principles and applications of fluids (hydraulics)	2	8	8	32	13	52	2	8
Graphic arts area								
Fundamentals of design, finishing, and reproduction of printed materials	7	28	10	40	5	20	3	12
Techniques of quantity production of printed materials	5	20	9	36	9	36	2	8
Plastics area								
Chemical and physical properties of plastic resins	6	24	12	48	5	20	2	8
Plastics processing methods	6	24	14	56	3	12	2	8

Table 58 (Continued)

Course	Essential N	Essential %	Important N	Important %	Desirable N	Desirable %	No Value N	No Value %
General area								
Industrial education--its place in society	11	44	10	40	3	12	1	4
Planning and layout of industrial shops, laboratories, and classroom facilities	15	60	7	28	2	8	1	4
Initiating and maintaining effective safety programs	20	80	4	16	-		1	4

Vocational-technical Members of the vocational-technical group evaluated algebra, trigonometry, and physics 'Essential' in the following respective percents: 72.0, 64.0, and 54.0. Organic chemistry was rated 'No value' by 55.0 percent. A complete report of frequencies is found in Table 60. In Tables 61 through 64, it can be seen that the high frequencies of replies occurred in psychology and communicative arts. The low frequencies were in the humanities and biological sciences.

Within the industrial-education core content, the electricity-electronics, drafting, metals, and safety areas appeared predominately 'Important' or 'Essential'. Table 65 also reveals little need for the content within the areas of wood, power, plastics, graphic arts, and finishing.

Very little variation from the responses of the other groups is noticeable in the data included in Table 66. The elements were rated primarily 'Essential' and 'Important'.

Table 59. Evaluation of industrial education course content, methods of teaching--by education occupational group, junior high school N = 25

	Essential		Important		Desirable		Awareness needed		Not needed	
	N	%	N	%	N	%	N	%	N	%
Understanding the teacher's role in the profession	15	60	4	16	4	16	1	4	1	4
Selecting and caring for equipment	16	64	7	28	2	8	-		-	
Understanding public relations	11	44	10	40	3	12	1	4	-	
Determining course content	16	64	8	32	1	4	-		-	
Developing courses	18	72	6	24	1	4	-		-	
Planning daily lessons	13	52	8	32	4	16	-		-	
Evaluating student progress	17	68	5	20	3	12	-		-	
Preparing a budget	9	36	6	24	7	28	2	8	1	4
Developing competency in the teaching act	17	68	6	24	1	4	1	4	-	

Table 60. Evaluation of physical science and mathematics course content--by education occupational group, vocational-technical N = 11

Course	Essential N	Essential %	Important N	Important %	Desirable N	Desirable %	No Value N	No Value %
Organic chemistry	-		-		5	45	6	55
Inorganic chemistry	-		4	36	7	74	-	
Fundamentals of algebra	8	72	2	18	1	10	-	
Fundamentals of trigonometry	7	64	2	18	2	18	-	
Analytic geometry	2	18	7	64	1	9	1	9
Objectives and procedures of cost accounting	1	9	1	9	5	46	4	36
Calculus	2	18	3	28	4	36	2	18
Principles of statistics	-		2	18	8	73	1	9
Application of statistics	-		2	18	7	64	2	18
Computer organization	1	9	2	18	6	55	2	18
Computer programing	1	9	4	36	4	36	2	18
Concepts and principles of physics	6	54	5	46	-		-	

Table 61. Evaluation of social science course content--by education occupational group, vocational-technical N = 11

Course	Essential N	Essential %	Important N	Important %	Desirable N	Desirable %	No Value N	No Value %
Economic principles, problems and policies	-		1	9	9	82	1	9
Structure and organization of trade unions	2	18	3	27	6	55	-	
Problems, policies and procedures in contemporary labor relations	2	18	3	27	6	55	-	
Governmental functions and processes	1	9	2	18	7	64	1	9
Fundamental psychological concepts	4	36	4	36	3	28	-	
Principles of motivation and learning	8	73	3	27	-		-	
Psychological development of the individual	4	36	5	46	2	18	-	
Application of human learning principles to classroom situations	8	73	3	27	-		-	
Analysis of group, community, and cultural relations	3	27	8	73	-		-	

Table 62. Evaluation of biological science course content--by education occupational group, vocational-technical N = 11

Course	Essential N	Essential %	Important N	Important %	Desirable N	Desirable %	No Value N	No Value %
Organization and function of living systems	-		-		7	64	4	36
Physiology and anatomy of humans	-		-		6	55	5	45

Table 63. Evaluation of humanities course content--by education occupational group, vocational-technical N = 11

Course	Essential N	Essential %	Important N	Important %	Desirable N	Desirable %	No Value N	No Value %
Social and cultural development of western civilization	-		-		7	64	4	36
Political, economic and social development of the United States	-		-		9	82	2	18

Table 64. Evaluation of communicative arts course content--by education occupational group, vocational-technical N = 11

Course	Essential N	Essential %	Important N	Important %	Desirable N	Desirable %	No Value N	No Value %
Writing as a means to communicate ideas, judgements, observations, and other information	7	64	4	36	-		-	
Reading and observations as a source of information	7	64	4	36	-		-	
Principles of oral communications	8	73	3	27	-		-	
Group communication problems and practices	8	73	3	27	-		-	

Table 65. Evaluation of industrial education course content--by education occupational group, vocational-technical N = 11

Course	Essential N	Essential %	Important N	Important %	Desirable N	Desirable %	No Value N	No Value %
Wood area								
Wood fabricating techniques	2	18	-		5	46	4	36
Principles of building construction	2	18	2	18	3	28	4	36
Chemical and physical properties of wood	1	9	1	9	4	36	5	46
Processing of wood products	1	9	1	9	3	27	6	55
Drafting area								
Principle elements of mechanical drafting	5	45	3	27	3	27	-	
Fundamentals of freehand drafting	4	36	5	46	2	18	-	
Architectural drafting conventions and techniques	2	18	2	18	5	46	2	18
Spatial geometry (descriptive)	3	27	5	46	3	27	-	
Design principles	3	27	5	46	2	18	1	9
Finishing area								
Materials, products, processing of finishing	2	18	3	27	2	18	4	37
Electricity-electronics area								
Direct current circuit analysis	8	73	3	27	-		-	
Alternating current circuit analysis	8	73	3	27	-		-	
Familiarization with and practical application of modern electronic test equipment	6	55	5	45	-		-	
Theory and application of semi-conductor devices	6	55	3	27	2	18	-	
Television theory and service procedure	3	28	4	36	4	36	-	
Electric motor theory and controls	2	18	6	55	3	27	-	
Theory and application of computer circuitry	3	27	2	18	5	46	1	9

Table 65 (Continued)

Course	Essential N	Essential %	Important N	Important %	Desirable N	Desirable %	No Value N	No Value %
Metals area								
Basic metal casting procedures	2	18	4	37	3	27	2	18
Heat treating principles and techniques	3	27	2	19	3	27	3	27
Use of metalworking tools	2	18	5	46	4	36	-	
Fundamental metal machine operations	5	46	3	27	3	27	-	
Relationship between structure and properties of metals	-		6	55	4	36	1	9
Principles and practices of sheet metal fabrication	1	9	8	73	2	18	-	
Welding ferrous and non-ferrous metals	3	27	3	27	3	27	2	19
Fundamentals of metal spinning	-		-		5	45	6	55
Power mechanics area								
Sources, development, and application of power	2	18	6	46	1	9	2	18
The automobile industry	2	18	-		6	46	3	27
Operating principles of automobile components	3	27	2	18	4	37	2	18
Service of automobile components	2	18	1	9	3	27	5	46
Principles and applications of fluids (hydraulics)	4	36	2	18	5	46	-	
Graphic arts area								
Fundamentals of design, finishing, and reproduction of printed materials	1	9	3	27	4	37	3	27
Techniques of quantity Production of printed materials	1	10	0		5	45	5	45
Plastics area								
Chemical and physical properties of plastic resins	1	10	0		5	45	5	45
Plastics processing methods	-		1	10	5	45	5	45

Table 65 (Continued)

Course	Essential N	Essential %	Important N	Important %	Desirable N	Desirable %	No Value N	No Value %
General area								
Industrial education--its place in society	3	28	4	36	4	36	-	
Planning and layout of industrial shops, laboratories, and classroom facilities	4	36	6	55	1	9	-	
Initiating and maintaining effective safety programs	6	55	4	36	1	9	-	

Education areas of work

Instruction and administration were the two major areas of work in which most education-employed industrial-education graduates were classified. The divisions within the instruction area included: 1. multifield industrial laboratory instruction--a multifield laboratory is also referred to as a comprehensive general shop. 2. singlefield industrial laboratory instruction--these laboratories have also been called limited general shops and general unit shops. 3. area unit industrial laboratory instruction--area unit laboratories are sometimes referred to as unit shops (1). A fourth classification was added to the questionnaire--non-industrial laboratory instruction. This classification includes the instruction in professional courses, courses related to industrial laboratory instruction, and courses considered to be part of general education.

The classifications within the administration area of work listed on the questionnaire were principal, supervisor, superintendent, director, business administrator, coordinator, and building and grounds.

Table 66. Evaluation of industrial education course content, methods of teaching--by education occupational group, vocational-technical N = 11

	Essential		Important		Desirable		Awareness needed		Not needed	
	N	%	N	%	N	%	N	%	N	%
Understanding the teacher's role in the profession	6	55	4	36	1	9	-		-	
Selecting and caring for equipment	6	55	3	27	1	9	1	9	-	
Understanding public relations	4	37	5	45	2	18	-		-	
Determining course content	10	91	1	9	-		-		-	
Developing courses	10	91	1	9	-		-		-	
Planning daily lessons	6	55	4	36	1	9	-		-	
Evaluating student progress	9	82	1	9	1	9	-		-	
Preparing a budget	3	27	3	27	4	37	1	9	-	
Developing competency in the teaching act	8	73	3	27	-		-		-	

In neither non-industrial laboratory instruction nor administration were there individual frequencies of ten or more. Consequently, all frequencies within the non-industrial laboratory classification were treated together in tables so titled, and all frequencies within the administration area were treated together in tables titled Administration.

Multifield industrial laboratory instruction On the needed side of the rating scale, the largest percentages of replies for the physical science and mathematics content occurred in inorganic chemistry, algebra, trigonometry, analytic geometry, and physics. All other content high frequencies were on the 'Not needed' side. The specific frequencies and percentages can be seen in Table 67.

Social science course content data indicate that of the nine content areas, only economics, trade unions, and labor relations were not rated 'Important' by those in the multifield classification. These data are found in Table 68.

Contained in Tables 69 and 70 are data which report that in the opinions of the majority of respondents, biological science and humanities content were not needed in the performance of the tasks associated with multifield instruction.

The information contained in Table 71 discloses that the communicative arts course content were rated on the needed side by more than 81.0 percent. In all content areas listed, at least 51.0 percent indicated that these were 'Essential' to the position.

Table 72 contains the data which refer to all of the industrial education core content. As can be seen, most of the content was rated 'Essential'

by the largest percent of respondents. It can also be seen that very few of the respondents rated content 'No value'.

Most multifield laboratory instructors, as reported by Table 73, rated the elements of methods of teaching either 'Essential' or 'Important'.

Table 67. Evaluation of physical science and mathematics course content--by education area of work, multifield laboratory instruction N = 16

Course	Essential N	Essential %	Important N	Important %	Desirable N	Desirable %	No Value N	No Value %
Organic chemistry	-		1	6	7	44	8	50
Inorganic chemistry	-		6	38	5	31	5	31
Fundamentals of algebra	7	44	9	56	-		-	
Fundamentals of trigonometry	7	44	6	38	3	18	-	
Analytic geometry	1	6	9	56	4	26	2	12
Objectives and procedures of cost accounting	1	6	6	28	8	50	1	6
Calculus	-		-		5	31	11	69
Principles of statistics	-		2	12	9	56	5	32
Application of statistics	-		3	18	8	50	5	32
Computer organization	-		-		5	31	11	69
Computer programing	-		2	12	4	26	10	64
Concepts and principles of physics	1	6	9	56	5	32	1	6

Table 68. Evaluation of social science course content--by education area of work, multifield laboratory instruction N = 16

Course	Essential N	Essential %	Important N	Important %	Desirable N	Desirable %	No Value N	No Value %
Economic principles, problems and policies	-		1	6	5	31	7	43
Structure and organization of trade unions	-		4	25	11	69	1	6
Problems, policies and procedures in contemporary labor relations	1	6	5	31	7	43	3	19
Governmental functions and processes	1	6	6	38	6	38	3	18
Fundamental psychological concepts	3	19	9	56	4	25	-	
Principles of motivation and learning	5	32	9	56	2	12	-	
Psychological development of the individual	4	25	9	56	3	19	-	
Application of human learning principles to classroom situations	7	44	7	44	2	12	-	
Analysis of group, community, and cultural relations	4	25	7	43	5	32	-	

Table 69. Evaluation of biological science course content--by education area of work, multifield laboratory instruction N = 16

Course	Essential N	Essential %	Important N	Important %	Desirable N	Desirable %	No Value N	No Value %
Organization and function of living systems	-		2	12	8	50	6	38
Physiology and anatomy of humans	-		4	25	5	32	7	43

Table 70. Evaluation of humanities course content--by education area of work, multifield laboratory instruction N = 16

Course	Essential N	Essential %	Important N	Important %	Desirable N	Desirable %	No Value N	No Value %
Social and cultural development of western civilization	-		2	12	9	57	5	31
Political, economic and social development of the United States	1	6	4	25	8	51	3	18

Table 71. Evaluation of communicative arts course content--by education area of work, multifield laboratory instruction N - 16

Course	Essential N	Essential %	Important N	Important %	Desirable N	Desirable %	No Value N	No Value %
Writing as a means to communicate ideas, judgements, observations, and other information	8	51	5	31	2	12	1	6
Reading and observations as a source of information	9	57	5	31	1	6	1	6
Principles of oral communications	11	70	2	12	2	12	1	6
Group communication problems and practices	9	57	4	25	1	6	2	12

Table 72. Evaluation of industrial education course content--by education area of work, multifield laboratory instruction N = 16

Course	Essential N	Essential %	Important N	Important %	Desirable N	Desirable %	No Value N	No Value %
Wood area								
Wood fabricating techniques	11	70	3	18	2	12	-	
Principles of building construction	10	63	2	12	4	25	-	
Chemical and physical properties of wood	5	31	4	25	6	38	1	6
Processing of wood products	7	44	3	18	6	38	-	
Drafting area								
Principle elements of mechanical drafting	12	75	3	19	1	6	-	
Fundamentals of freehand drafting	10	62	3	19	3	19	-	
Architectural drafting conventions and techniques	7	44	3	19	5	31	1	6
Spatial geometry (descriptive)	7	44	4	25	4	25	1	6
Design principles	9	56	4	25	3	19	-	
Finishing area								
Materials, products, processing of finishing	10	62	3	19	3	19	-	
Electricity-electronics area								
Direct current circuit analysis	8	50	5	31	3	19	-	
Alternating current circuit analysis	8	50	5	31	3	19	-	
Familiarization with and practical application of modern electronic test equipment	7	44	5	31	4	25	-	
Theory and application of semi-conductor devices	4	25	4	25	6	37	2	13
Television theory and service procedure	2	13	3	19	6	37	5	31
Electric motor theory and controls	5	31	4	25	5	31	2	13
Theory and application of computer circuitry	2	12	-		7	44	7	44

Table 72 (Continued)

Course	Essential N	Essential %	Important N	Important %	Desirable N	Desirable %	No Value N	No Value %
Metals area								
Basic metal casting procedures	7	44	5	31	3	19	1	6
Heat treating principles and techniques	6	38	5	31	4	25	1	6
Use of metalworking tools	12	75	3	19	1	6	-	
Fundamental metal machine operations	11	69	3	19	2	12	-	
Relationship between structure and properties of metals	5	31	4	25	7	44	-	
Principles and practices of sheet metal fabrication	11	69	2	12	3	19	-	
Welding ferrous and non-ferrous metals	11	69	2	12	3	19	-	
Fundamentals of metal spinning	1	6	4	25	9	57	2	12
Power mechanics area								
Sources, development, and application of power	10	64	3	18	3	18	-	
The automobile industry	5	31	5	31	5	31	1	7
Operating principles of automobile components	9	57	3	18	3	18	1	7
Service of automobile components	10	64	2	12	3	18	1	6
Principles and applications of fluids (hydraulics)	2	12	4	25	9	57	1	6
Graphic arts area								
Fundamentals of design, finishing, and reproduction of printed materials	5	32	3	18	5	32	3	18
Techniques of quantity production of printed materials	3	18	4	25	7	45	2	12
Plastics area								
Chemical and physical properties of plastic resins	3	18	5	32	6	38	2	12
Plastics processing methods	4	25	6	38	4	25	2	12

Table 72 (Continued)

Course	Essential N	Essential %	Important N	Important %	Desirable N	Desirable %	No Value N	No Value %
General area								
Industrial education--its place in society	7	44	7	44	2	12	-	
Planning and layout of industrial shops, laboratories, and classroom facilities	10	64	3	18	2	12	1	6
Initiating and maintaining effective safety programs	13	82	2	12	1	6	-	

Singlefield industrial laboratory instruction Drafting, electricity, metals, power, and wood all had response frequencies of ten or more.

Drafting The frequencies of the replies of those who classified themselves singlefield laboratory instruction--drafting are contained in Tables 74 through 80. Only one course content area, calculus, was reported to be of 'No value' by more than 50.0 percent of the respondents. Within the remaining general education evaluations, five were rated 'Essential' by more than 50.0 percent. These and their respective percentages are principles of motivation and learning, 65.0 percent; application of human learning principles to classroom situations, 73.0 percent; writing, 64.0 percent; reading, 53.0 percent; and oral communication skills, 64.0 percent. The complete lists are presented in Tables 70 through 78.

Table 79 is a summary of the industrial education content evaluations. Two wood content areas were rated 'Essential' by more than 50.0 percent. Wood fabricating techniques and principles of building construction had, respectively, 59.0 percent and 53.0 percent 'Essential' ratings. All drafting

Table 73. Evaluation of industrial education course content, methods of teaching--by education area of work, multifield laboratory instruction N = 16

	Essential		Important		Desirable		Awareness needed		Not needed		
	N	%	N	%	N	%	N	%	N	%	
Understanding the teacher's role in the profession	10	62	3	19	3	19	-		-		
Selecting and caring for equipment	14	87	2	13	-		-		-		
Understanding public relations	7	44	7	44	1	6	1	6	-		
Determining course content	9	57	6	37	-		1	6	-		
Developing courses	12	76	2	12	-		1	6	1	6	88
Planning daily lessons	5	31	9	57	2	12	-		-		
Evaluating student progress	9	57	7	43	-		-		-		
Preparing a budget	5	32	7	43	3	19	1	6	-		
Developing competency in the teaching act	11	69	5	31	-		-		-		

content was rated 'Essential' by more than 50.0 percent. Spatial geometry had the lowest percent, 53.0. Elements of mechanical drafting was rated by 94.0 percent 'Essential'. Other content areas with over 50.0 percent indicating 'Essential' were finishing, 58.0 percent; use of metalworking tools, 59.0 percent; metal machining operations, 59.0 percent; principles of sheet metal fabrication, 53.0 percent; sources, development, and application of power, 58.0 percent; facility planning, 64.0 percent; and initiating and maintaining effective safety programs, 82.0 percent.

The data which are contained in Table 80 indicate that a need for all the elements of methods of teaching was recognized by most respondents.

Table 74. Evaluation of physical science and mathematics course content--by education area of work, singlefield laboratory instruction--drafting N = 17

Course	Essential N	Essential %	Important N	Important %	Desirable N	Desirable %	No Value N	No Value %
Organic chemistry	1	6	3	17	8	49	5	28
Inorganic chemistry	2	12	4	23	6	37	5	28
Fundamentals of algebra	8	49	4	23	5	29	-	
Fundamentals of trigonometry	4	23	7	40	6	37	-	
Analytic geometry	2	12	7	40	6	37	-	
Objectives and procedures of cost accounting	2	12	4	23	8	49	3	16
Calculus	-		1	6	6	36	10	58
Principles of statistics	-		7	41	6	36	4	23
Application of statistics	-		8	47	6	36	3	17
Computer organization	-		1	6	10	58	6	36
Computer programing	-		1	6	10	58	6	36
Concepts and principles of physics	4	22	8	48	4	22	1	6

Table 75. Evaluation of social science course content--by education area of work, singlefield laboratory instruction--drafting N = 17

Course	Essential N	Essential %	Important N	Important %	Desirable N	Desirable %	No Value N	No Value %
Economic principles, problems and policies	3	17	3	17	9	54	2	12
Structure and organization of trade unions	1	6	6	34	8	48	2	12
Problems, policies and procedures in contemporary labor relations	-		8	48	7	40	2	12
Governmental functions and processes	3	17	5	31	7	40	2	12
Fundamental psychological concepts	7	41	6	35	3	18	1	6
Principles of motivation and learning	11	65	4	23	2	12	0	
Psychological development of the individual	8	48	5	29	4	23	-	
Application of human learning principles to classroom situations	12	73	3	17	2	12	-	
Analysis of group, community, and cultural relations	5	30	6	35	6	35	-	

Table 76. Evaluation of biological science course content--by education area of work, singlefield laboratory instruction--drafting N = 17

Course	Essential N	Essential %	Important N	Important %	Desirable N	Desirable %	No Value N	No Value %
Organization and function of living systems	1	6	3	17	9	54	4	23
Physiology and anatomy of humans	1	6	4	23	8	48	4	23

Table 77. Evaluation of humanities course content--by education area of work, singlefield laboratory instruction--drafting N = 17

Course	Essential N	Essential %	Important N	Important %	Desirable N	Desirable %	No Value N	No Value %
Social and cultural development of western civilization	2	12	3	18	9	52	3	18
Political, economic and social development of the United States	3	18	3	18	8	46	3	18

Table 78. Evaluation of communicative arts course content--by education area of work, singlefield laboratory instruction--drafting N = 17

Course	Essential N	Essential %	Important N	Important %	Desirable N	Desirable %	No Value N	No Value %
Writing as a means to communicate ideas, judgements, observations, and other information	11	64	4	24	1	6	1	6
Reading and observations as a source of information	9	53	5	29	2	12	1	6
Principles of oral communications	11	64	4	24	1	6	1	6
Group communication problems and practices	7	41	8	47	1	6	1	6

Table 79. Evaluation of industrial education course content--by education area of work, singlefield laboratory instruction--drafting N = 17

Course	Essential N	Essential %	Important N	Important %	Desirable N	Desirable %	No Value N	No Value %
Wood area								
Wood fabricating techniques	10	59	7	41	-		-	
Principles of building construction	9	53	7	41	1	6	-	
Chemical and physical properties of wood	5	29	8	47	3	18	1	6
Processing of wood products	5	29	8	47	3	18	1	6
Drafting area								
Principle elements of mechanical drafting	16	94	1	6	-		-	
Fundamentals of freehand drafting	14	82	2	12	1	6	-	
Architectural drafting conventions and techniques	12	70	3	18	2	12	-	
Spatial geometry (descriptive)	9	53	6	35	2	12	-	
Design principles	13	76	3	18	1	6	-	
Finishing area								
Materials, products, processing of finishing	10	58	4	24	2	12	1	6
Electricity-electronics area								
Direct current circuit analysis	6	34	5	30	5	30	1	6
Alternating current circuit analysis	6	34	4	26	6	34	1	6
Familiarization with and practical application of modern electronic test equipment	5	30	3	18	7	40	2	12
Theory and application of semi-conductor devices	5	30	2	12	7	40	3	18
Television theory and service procedure	2	12	3	18	8	47	4	23
Electric motor theory and controls	4	23	5	30	6	35	2	12
Theory and application of computer circuitry	1	6	3	18	7	40	6	36

Table 79 (Continued)

Course	Essential N	Essential %	Important N	Important %	Desirable N	Desirable %	No Value N	No Value %
Metals area								
Basic metal casting procedures	6	35	8	47	3	18	-	
Heating treating principles and techniques	7	41	7	41	2	12	1	6
Use of metalworking tools	10	59	6	35	1	6	-	
Fundamental metal machine operations	10	59	5	29	2	12	-	
Relationship between structure and properties of metals	4	24	7	41	5	29	1	6
Principles and practices of sheet metal fabrication	9	53	5	29	3	18	-	
Welding ferrous and non-ferrous metals	6	35	5	30	5	29	1	6
Fundamentals of metal spinning	2	12	4	24	6	35	5	29
Power mechanics area								
Sources, development, and application of power	10	58	3	18	3	18	1	6
The automobile industry	5	29	5	29	6	36	1	6
Operating principles of automobile components	7	41	5	29	4	24	1	6
Service of automobile components	7	41	4	24	5	29	1	6
Principles and applications of fluids (hydraulics)	4	24	4	24	8	46	1	6
Graphic arts area								
Fundamentals of design, finishing, and reproduction of printed materials	6	35	7	41	2	12	2	12
Techniques of quantity production of printed materials	4	24	5	29	6	35	2	12
Plastics area								
Chemical and physical properties of plastic resins	6	35	7	41	3	18	1	6
Plastics processing methods	6	35	8	47	2	12	1	6

Table 79 (Continued)

Course	Essential N	Essential %	Important N	Important %	Desirable N	Desirable %	No Value N	No Value %
General area								
Industrial education--its place in society	8	47	5	29	3	18	1	6
Planning and layout of industrial shops, laboratories, and classroom facilities	11	64	3	18	2	12	1	6
Initiating and maintaining effective safety programs	14	82	2	12	-		1	6

Electricity-electronics Most graduates who indicated their singlefield instruction to be the area of electricity marked algebra 'Essential'. Table 81 reveals that 75.0 percent marked algebra 'Essential'. The only other general education content areas which recieved more than 50.0 percent of 'Essential' replies were the communicative arts writing, reading, and oral communication skills. These data are found in Tables 81 through 85.

An examination of the industrial education content evaluations found in Table 86 discloses that in addition to drafting and electricity-electronics, several metals content areas had 'Essential' marked by a large percent or respondents. Two other areas, sources, development, and application of power, and initiating and maintaining safety programs also were ranked 'Essential' by the electricity singlefield classification respondents.

The methods of teaching elements were rated in a manner consistent with other education-employed graduates with the highest percentages of responses being in the 'Essential' rank. A complete summary is presented in Table 87.

Table 80. Evaluation of industrial education course content, methods of teaching--by education area of work, singlefield laboratory instruction--drafting N = 17

	Essential		Important		Desirable		Awareness needed		Not needed	
	N	%	N	%	N	%	N	%	N	%
Understanding the teacher's role in the profession	9	52	3	18	4	24	1	6	-	
Selecting and caring for equipment	9	52	7	42	1	6	-		-	
Understanding public relations	6	36	9	52	2	12	-		-	
Determining course content	13	76	3	18	1	6	-		-	
Developing courses	13	76	2	12	1	6	1	6	-	
Planning daily lessons	10	60	4	22	3	18	-		-	
Evaluating student progress	13	76	2	12	2	12	-		-	
Preparing a budget	6	34	4	24	7	42	-		-	
Developing competency in the teaching act	10	60	7	40	-		-		-	

Table 81. Evaluation of physical science and mathematics course content--by education area of work, singlefield laboratory instruction--electricity-electronics N = 12

Course	Essential N	Essential %	Important N	Important %	Desirable N	Desirable %	No Value N	No Value %
Organic chemistry	1	9	4	33	4	33	3	25
Inorganic chemistry	3	25	3	25	3	25	3	25
Fundamentals of algebra	9	75	2	17	1	8	-	
Fundamentals of trigonometry	6	50	3	25	3	25	-	
Analytic geometry	4	33	4	33	3	25	1	9
Objectives and procedures of cost accounting	3	25	3	25	4	33	2	17
Calculus	1	8	1	8	5	42	5	42
Principles of statistics	1	8	5	42	4	33	2	12
Application of statistics	1	8	6	50	3	25	2	17
Computer organization	1	8	2	17	6	50	3	25
Computer programing	1	9	4	33	4	33	3	25
Concepts and principles of physics	5	41	3	25	2	17	2	17

Table 82. Evaluation of social science course content--by education area of work, singlefield laboratory instruction--electricity-electronics N = 12

Course	Essential N	Essential %	Important N	Important %	Desirable N	Desirable %	No Value N	No Value %
Economics principles, problems, and policies	2	17	6	50	2	17	2	16
Structure and organization of trade unions	1	8	6	50	5	42	-	
Problems, policies and procedures in contemporary labor relations	-		6	50	4	33	2	17
Governmental functions and processes	2	17	5	42	3	24	2	17
Fundamental psychological concepts	5	42	5	42	1	8	1	8
Principles of motivation and learning	6	50	5	42	1	8	-	
Psychological development of the individual	5	42	4	33	3	25	-	
Application of human learning principles to classroom situations	6	50	3	25	3	25	-	
Analysis of group, community, and cultural relations	4	34	4	33	3	25	1	8

Table 83. Evaluation of biological science course content--by education area of work, singlefield laboratory instruction--electricity-electronics N = 12

Course	Essential N	Essential %	Important N	Important %	Desirable N	Desirable %	No Value N	No Value %
Organization and function of living systems	1	8	5	42	4	33	2	17
Physiology and anatomy of humans	1	8	5	42	3	25	3	25

Table 84. Evaluation of humanities course content--by education area of work, singlefield laboratory instruction--electricity-electronics N = 12

Course	Essential N	Essential %	Important N	Important %	Desirable N	Desirable %	No Value N	No Value %
Social and cultural development of western civilization	2	17	1	8	4	33	5	42
Political, economic and social development of the United States	3	25	4	33	2	17	3	25

Table 85. Evaluation of communicative arts course content--by education area of work, singlefield laboratory instruction--electricity-electronics N = 12

Course	Essential N	Essential %	Important N	Important %	Desirable N	Desirable %	No Value N	No Value %
Writing as a means to communicate ideas, judgements, observations, and other information	10	84	1	8	-		1	8
Reading and observations as a source of information	9	75	2	17	-		1	8
Principles of oral communications	10	83	2	17	-		-	
Group communication problems and practices	6	50	4	33	-		2	17

Table 86. Evaluation of industrial education course content--by education area of work, singlefield laboratory instruction--electricity-electronics N = 12

Course	Essential N	Essential %	Important N	Important %	Desirable N	Desirable %	No Value N	No Value %
Wood area								
Wood fabricating techniques	6	50	5	42	-		1	8
Principles of building construction	6	50	5	42	1	8	-	
Chemical and physical properties of wood	5	42	4	33	1	8	2	17
Processing of wood products	6	50	4	34	1	8	1	8
Drafting area								
Principle elements of mechanical drafting	8	67	3	25	1	8	-	
Fundamentals of freehand drafting	6	50	3	25	3	25	-	
Architectural drafting conventions and techniques	4	34	7	58	1	8	-	
Spatial geometry (descriptive)	3	25	6	50	3	25	-	
Design principles	7	58	4	34	1	8	-	
Finishing area								
Materials, products, processing of finishing	6	50	4	34	1	8	1	8
Electricity-electronics area								
Direct current circuit analysis	9	75	3	25	-		-	
Alternating current circuit analysis	9	75	3	25	-		-	
Familiarization with and practical application of modern electronic test equipment	8	67	4	33	-		-	
Theory and application of semi-conductor devices	9	75	3	25	-		-	
Television theory and service procedure	6	50	2	17	3	25	1	8
Electric motor theory and controls	7	59	3	25	1	8	1	8
Theory and application of computer circuitry	4	33	3	25	3	25	2	17

Table 86 (Continued)

Course	Essential N	Essential %	Important N	Important %	Desirable N	Desirable %	No Value N	No Value %
Metals area								
Basic metal casting procedures	4	33	5	42	3	25	-	
Heat treating principles and techniques	5	42	6	50	1	8	-	
Use of metalworking tools	9	75	2	17	1	8	-	
Fundamental metal machine operations	10	84	1	8	1	8	-	
Relationship between structure and properties of metals	6	50	4	33	2	17	-	
Principles and practices of sheet metal fabrication	8	67	4	33	-		-	
Welding ferrous and non-ferrous metals	7	58	3	25	2	17	-	
Fundamentals of metal spinning	2	17	3	25	6	50	1	8
Power mechanics area								
Sources, development, and application of power	8	67	3	25	1	8	-	
The automobile industry	4	33	2	17	6	50	-	
Operating principles of automobile components	6	50	5	42	1	8	-	
Service of automobile components	6	50	2	17	4	33	-	
Principles and applications of fluids (hydraulics)	1	8	5	42	6	50	-	
Graphic arts area								
Fundamentals of design, finishing, and reproduction of printed materials	3	25	5	42	4	33	-	
Techniques of quantity production of printed materials	2	17	4	33	6	50	-	
Plastics area								
Chemical and physical properties of plastic resins	2	17	5	42	4	33	1	8
Plastics processing methods	2	17	7	58	2	17	1	8

Table 86 (Continued)

Course	Essential N	Essential %	Important N	Important %	Desirable N	Desirable %	No Value N	No Value %
General area								
Industrial education--its place in society	6	50	5	42	-		1	8
Planning and layout of industrial shops, laboratories, and classroom facilities	7	58	4	34	1	8	-	
Initiating and maintaining effective safety programs	10	83	2	17	-		-	

Metals The data contained in Tables 88 through 92 are the frequencies and percentages of responses of the respondents classified as singlefield laboratory instructions--metals. The responses do not vary appreciable from those of the preceding classification.

The evaluation of the industrial education course content, Table 93, discloses that although those of the metals classification rated most metals content 'Essential' or 'Important', fundamentals of metal spinning was rated as only 'Desirable' by 73.0 percent. Sources of power, direct current circuit analysis, and alternating current circuit analysis were all rated as 'Essential' by more than 50.0 percent. As can be seen in Table 94, the elements of methods of teaching were rated 'Essential' by most of the respondents of the metals singlefield laboratory instruction classification.

Table 87. Evaluation of industrial education course content, methods of teaching--by education area of work, singlefield laboratory instruction--electricity-electronics N = 12

	Essential		Important		Desirable		Awareness needed		Not needed	
	N	%	N	%	N	%	N	%	N	%
Understanding the teacher's role in the profession	9	75	2	17	1	8	-		-	
Selecting and caring for equipment	10	84	1	8	1	8	-		-	
Understanding public relations	8	67	3	25	1	8	-		-	
Determining course content	9	75	3	25	-		-		-	
Developing courses	11	92	1	8	-		-		-	
Planning daily lessons	8	66	2	17	2	17	-		-	
Evaluating student progress	11	92	1	8	-		-		-	
Preparing a budget	6	50	3	25	3	25	-		-	
Developing competency in the teaching act	10	83	2	17	-		-		-	

Table 88. Evaluation of physical science and mathematics course content--by education area of work, singlefield laboratory instruction--metals N = 15

Course	Essential N	Essential %	Important N	Important %	Desirable N	Desirable %	No Value N	No Value %
Organic chemistry	1	6	4	27	6	40	4	27
Inorganic chemistry	3	20	4	27	5	33	3	20
Fundamentals of algebra	10	67	3	20	2	13	-	
Fundamentals of trigonometry	7	47	5	33	3	20	-	
Analytic geometry	3	20	4	26	7	47	1	7
Objectives and procedures of cost accounting	3	20	3	20	7	47	2	13
Calculus	1	7	2	13	5	33	7	47
Principles of statistics	1	7	6	40	5	33	3	20
Application of statistics	1	8	6	40	4	26	4	26
Computer organization	1	7	2	13	6	40	6	40
Computer programing	1	7	4	27	5	33	5	33
Concepts and principles of physics	6	41	5	33	2	13	2	13

Table 89. Evaluation of social science course content--by education area of work, singlefield laboratory instruction--metals N = 15

Course	Essential N	Essential %	Important N	Important %	Desirable N	Desirable %	No Value N	No Value %
Economic principles, problems and policies	2	13	6	40	4	27	3	20
Structure and organization of trade unions	1	7	5	33	8	53	1	7
Problems, policies and procedures in contemporary labor relations	-		5	33	7	47	3	20
Governmental functions and processes	2	13	5	33	5	33	3	21
Fundamental psychological concepts	6	40	7	46	1	7	1	7
Principles of motivation and learning	6	40	8	53	1	7	-	
Psychological development of the individual	5	33	7	46	3	21	-	
Application of human learning principles to classroom situations	8	53	3	20	4	27	-	
Analysis of group, community, and cultural relations	4	27	5	33	5	33	1	7

Table 90. Evaluation of biological science course content--by education area of work, singlefield laboratory instruction--metals N = 15

Course	Essential N	Essential %	Important N	Important %	Desirable N	Desirable %	No Value N	No Value %
Organization and function of living systems	-		5	33	7	47	3	20
Physiology and anatomy of humans	1	7	4	27	6	40	4	26

Table 91. Evaluation of humanities course content--by education area of work, singlefield laboratory instruction--metals N = 15

Course	Essential N	Essential %	Important N	Important %	Desirable N	Desirable %	No Value N	No Value %
Social and cultural development of western civilization	2	13	2	13	6	40	5	34
Political, economic and social development of the United States	3	20	4	27	5	34	3	19

Table 92. Evaluation of communicative arts course content--by education area of work, singlefield laboratory instruction--metals N = 15

Course	Essential N	Essential %	Important N	Important %	Desirable N	Desirable %	No Value N	No Value %
Writing as a means to communicate ideas, judgements, observations, and other information	10	66	4	27	-		1	7
Reading and observations as a source of information	11	73	4	27	-		-	
Principles of oral communications	11	73	4	27	-		-	
Group communication problems and practices	7	46	6	40	-		2	14

Table 93. Evaluation of industrial education course content--by education area of work, singlefield laboratory instruction--metals N = 15

Course	Essential N	Essential %	Important N	Important %	Desirable N	Desirable %	No Value N	No Value %
Wood area								
Wood fabricating techniques	5	34	7	46	3	20	-	
Principles of building construction	6	40	6	40	2	13	1	7
Chemical and physical properties of wood	5	34	5	33	3	20	2	13
Processing of wood products	3	20	9	60	2	13	1	7
Drafting area								
Principle elements of mechanical drafting	10	66	5	34	-		-	
Fundamentals of freehand drafting	8	53	6	40	1	7	-	
Architectural drafting conventions and techniques	4	27	7	46	4	27	-	
Spatial geometry (descriptive)	4	27	8	53	3	20	-	
Design principles	6	40	9	60	-		-	
Finishing area								
Materials, products, processing of finishing	6	40	7	46	2	14	-	
Electricity-electronics area								
Direct current circuit analysis	8	53	4	27	3	20	-	
Alternating current circuit analysis	8	53	4	27	3	20	-	
Familiarization with and practical application of modern electronic test equipment	7	45	5	34	2	14	1	7
Theory and application of semi-conductor devices	6	40	6	40	1	7	2	13
Television theory and service procedure	3	20	3	20	6	40	3	20
Electric motor theory and controls	5	33	5	33	3	20	2	14
Theory and application of computer circuitry	2	14	2	14	7	45	4	27

Table 93 (Continued)

Course	Essential N	Essential %	Important N	Important %	Desirable N	Desirable %	No Value N	No Value %
Metals area								
Basic metal casting procedures	6	40	7	47	2	13	-	
Heat treating principles and techniques	9	60	6	40	-		-	
Use of metalworking tools	13	87	2	13	-		-	
Fundamental metal machine operations	13	87	2	13	-		-	
Relationship between structure and properties of metals	8	53	5	34	2	13	-	
Principles and practices of sheet metal fabrication	10	66	4	27	1	7	-	
Welding ferrous and non-ferrous metals	10	66	2	14	3	20	-	
Fundamentals of metal spinning	1	7	3	20	11	73	-	
Power mechanics area								
Sources, development, and application of power	10	67	3	20	2	13	-	
The automobile industry	5	34	3	20	7	46	-	
Operating principles of automobile components	8	54	4	26	3	20	-	
Service of automobile components	8	54	2	13	4	26	1	7
Principles and applications of fluids (hydraulics)	1	7	3	20	6	40	5	33
Graphic arts area								
Fundamentals of design, finishing, and reproduction of printed materials	3	20	6	40	6	40	-	
Techniques of quantity production of printed materials	2	13	5	33	8	54	-	
Plastics area								
Chemical and physical properties of plastic resins	2	13	6	40	6	40	1	7
Plastics processing methods	2	13	8	53	4	27	1	7

Table 93 (Continued)

Course	Essential N	Essential %	Important N	Important %	Desirable N	Desirable %	No Value N	No Value %
General area								
Industrial education--its place in society	4	26	8	53	3	21	-	
Planning and layout of industrial shops, laboratories, and classroom facilities	7	47	7	47	1	6	-	
Initiating and maintaining effective safety programs	12	80	3	20	-		-	

Power mechanics The evaluations of the general education content by those in the power mechanics singlefield classification, presented in Tables 95 through 99, were similar to those of other areas of work.

Within the industrial education content areas, it is reported that the major percentage of power mechanics respondents did not rank any wood content 'Essential'. Metalworking tools, sheet metal fabrication and welding are three metals content areas which were rated 'Essential' by 64.0 percent of the power mechanics respondents. All power mechanics content areas, with the exception of principles and application of fluids, had the major percent of replies in the 'Essential' category. The entire list of evaluation of industrial education course content by power mechanics singlefield laboratory instruction is found in Table 100. The data summarized in Table 101 reveal no unusual variations from the evaluations of the other singlefield laboratory instruction classification.

Table 94. Evaluation of industrial education course content, methods of teaching--by education area of work, singlefield laboratory instruction--metals N = 15

	Essential N	Essential %	Important N	Important %	Desirable N	Desirable %	Awareness needed N	Awareness needed %	Not needed N	Not needed %
Understanding the teacher's role in the profession	10	67	4	26	1	7	-		-	
Selecting and caring for equipment	11	73	3	20	1	7	-		-	
Understanding public relations	10	67	5	33	-		-		-	
Determining course content	12	80	3	20	-		-		-	
Developing courses	13	87	2	13	-		-		-	
Planning daily lessons	8	54	4	26	3	20	-		-	
Evaluating student progress	12	80	2	13	1	7	-		-	
Preparing a budget	6	41	5	33	4	26	-		-	
Developing competency in the teaching act	13	87	2	13	-		-		-	

Table 95. Evaluation of physical science and mathematics course content--by education area of work, singlefield laboratory instruction--power mechanics N = 11

Course	Essential N	Essential %	Important N	Important %	Desirable N	Desirable %	No Value N	No Value %
Organic chemistry	1	10	2	18	4	36	4	36
Inorganic chemistry	1	9	3	28	4	36	3	28
Fundamentals of algebra	6	54	2	18	3	28	-	
Fundamentals of trigonometry	5	46	2	18	4	36	-	
Analytic geometry	2	18	1	9	6	55	2	18
Objectives and procedures of cost accounting	3	28	3	28	4	35	1	9
Calculus	-		1	9	4	37	6	54
Principles of statistics	2	18	3	27	2	18	4	37
Application of statistics	1	9	3	27	3	27	4	37
Computer organization	-		2	17	4	37	5	46
Computer programing	-		3	27	3	27	5	46
Concepts and principles of physics	4	37	5	46	2	17	-	

Table 96. Evaluation of social science course content--by education area of work, singlefield laboratory instruction--power mechanics N = 11

Course	Essential N	Essential %	Important N	Important %	Desirable N	Desirable %	No Value N	No Value %
Economic principles, problems, and policies	1	9	4	37	3	27	3	27
Structure and organization of trade unions	1	9	5	46	3	27	2	18
Problems, policies and procedures in contemporary labor relations	-		4	37	4	37	3	26
Governmental functions and processes	2	18	3	28	3	27	3	27
Fundamental psychological concepts	4	37	7	63	-		-	
Principles of motivation and learning	4	37	7	63	-		-	
Psychological development of the individual	3	27	8	73	-		-	
Application of human learning principles to classroom situations	5	45	5	45	1	10	-	
Analysis of group, community, and cultural relations	2	18	6	55	3	27	-	

Table 97. Evaluation of biological science course content--by education area of work, singlefield laboratory instruction--power mechanics N = 11

Course	Essential N	Essential %	Important N	Important %	Desirable N	Desirable %	No Value N	No Value %
Organization and function of living systems	-		4	36	4	36	3	28
Physiology and anatomy of humans	1	9	2	19	4	36	4	36

Table 98. Evaluation of humanities course content--by education area of work, singlefield laboratory instruction--power mechanics N = 11

Course	Essential N	Essential %	Important N	Important %	Desirable N	Desirable %	No Value N	No Value %
Social and cultural development of western civilization	2	18	2	18	4	37	3	27
Political, economic and social development of the United States	3	27	2	19	3	27	3	27

Table 99. Evaluation of communicative arts course content--by education area of work, singlefield laboratory instruction--power mechanics N = 11

Course	Essential N	Essential %	Important N	Important %	Desirable N	Desirable %	No Value N	No Value %
Writing as a means to communicate ideas, judgements, observations, and other information	8	73	3	27	-		-	
Reading and observations as a source of information	6	54	4	37	1	9	-	
Principles of oral communications	9	82	2	18	-		-	
Group communication problems and practices	6	54	4	37	-		1	9

Table 100. Evaluation of industrial education course content--by education area of work, singlefield laboratory instruction--power mechanics N = 11

Course	Essential N	Essential %	Important N	Important %	Desirable N	Desirable %	No Value N	No Value %
Wood area								
Wood fabricating techniques	3	27	5	46	3	27	-	
Principles of building construction	3	27	5	46	2	18	1	9
Chemical and physical properties of wood	2	18	5	46	2	18	2	18
Processing of wood products	2	18	6	55	2	18	1	9
Drafting area								
Principle elements of mechanical drafting	6	55	5	45	-		-	
Fundamentals of freehand drafting	6	55	3	27	1	9	1	9
Architectural drafting conventions and techniques	4	36	4	36	2	19	1	9
Spatial geometry (descriptive)	4	36	4	36	2	19	1	9
Design principles	4	36	6	54	1	9	-	
Finishing area								
Materials, products, processing of finishing	4	36	4	36	2	19	1	9
Electricity-electronics area								
Direct current circuit analysis	4	36	5	46	2	18	-	
Alternating current circuit analysis	4	36	5	46	2	18	-	
Familiarization with and practical application of modern electronic test equipment	4	36	4	36	2	19	1	9
Theory and application of semi-conductor devices	2	18	5	46	3	27	1	9
Television theory and service procedure	1	9	2	18	5	46	3	27
Electric motor theory and controls	4	36	4	36	1	9	2	19
Theory and application of computer circuitry	-		1	9	6	55	4	36

Table 100 (Continued)

Course	Essential N	Essential %	Important N	Important %	Desirable N	Desirable %	No Value N	No Value %
Metals area								
Basic metal casting procedures	1	9	6	55	3	27	1	9
Heat treating principles and techniques	3	27	6	55	1	9	1	9
Use of metalworking tools	7	64	3	27	-		1	9
Fundamental metal machine operations	6	56	4	36	1	9	-	
Relationship between structure and properties of metals	4	36	5	46	1	9	1	9
Principles and practices of sheet metal fabrication	7	64	2	18	1	9	1	9
Welding ferrous and non-ferrous metals	7	64	-		4	36	-	
Fundamentals of metal spinning	-		3	27	6	55	2	18
Power mechanics area								
Sources, development, and application of power	9	82	2	18	-		-	
The automobile industry	6	55	4	36	1	9	-	
Operating principles of automobile components	8	73	3	27	-		-	
Service of automobile components	8	73	2	18	1	9	-	
Principles and applications of fluids (hydraulics)	3	27	5	46	3	27	-	
Graphic arts area								
Fundamentals of design, finishing, and reproduction of printed materials	1	9	6	55	3	27	1	9
Techniques of quantity production of printed materials	1	9	6	55	3	27	1	9
Plastics area								
Chemical and physical properties of plastic resins	1	9	5	46	3	27	2	18
Plastics processing methods	1	9	6	55	2	18	2	18

Table 100 (Continued)

Course	Essential N	Essential %	Important N	Important %	Desirable N	Desirable %	No Value N	No Value %
General area								
Industrial education--its place in society	4	36	6	55	1	9	-	
Planning and layout of industrial shops, laboratories, and classroom facilities	6	55	5	45	-		-	
Initiating and maintaining effective safety programs	9	82	2	18	-		-	

Wood After examination of Tables 102 through 106, which are evaluations of general education content areas by singlefield laboratory instruction--wood, it can be concluded that little variation from the evaluations of the other single field classifications existed.

The content area chemical and physical properties of wood, as can be seen in Table 107, was rated 'Essential' by only 38.0 percent. Wood fabricating techniques, however, was rated 'Essential' by 90.0 percent. Finishing was also rated 'Essential' by a large percent of respondents. Direct current and alternating current circuit analysis were both rated 'Essential' by 56.0 percent of those replying.

Developing competency in the teaching act was rated 'Essential' by only 59.0 percent of this group. In general, the percent of 'Essential' replies found in Table 108 seems somewhat lower than those of the other classifications.

Table 101. Evaluation of industrial education course content, methods of teaching--by education area of work, singlefield laboratory instruction--power mechanics N = 11

	Essential		Important		Desirable		Awareness needed		Not needed	
	N	%	N	%	N	%	N	%	N	%
Understanding the teacher's role in the profession	7	64	2	18	1	9	1	9	-	
Selecting and caring for equipment	8	73	3	27	-		-		-	
Understanding public relations	4	37	6	54	1	9	-		-	
Determining course content	9	82	1	9	1	9	-		-	
Developing courses	10	91	-		1	9	-		-	
Planning daily lessons	7	64	2	18	2	18	-		-	
Evaluating student progress	8	73	2	18	1	9	-		-	
Preparing a budget	4	37	5	45	2	18	-		-	
Developing competency in the teaching act	9	82	2	18	-		-		-	

Table 102. Evaluation of physical science and mathematics course content--by education area of work, singlefield laboratory instruction--wood N = 19

Course	Essential N	Essential %	Important N	Important %	Desirable N	Desirable %	No Value N	No Value %
Organic chemistry	1	5	4	21	7	37	7	37
Inorganic chemistry	1	5	8	42	3	16	7	37
Fundamentals of algebra	8	42	7	37	4	21	-	
Fundamentals of trigonometry	5	26	8	42	6	32	-	
Analytic geometry	1	5	9	48	8	42	1	5
Objectives and procedures of cost accounting	2	10	4	21	9	48	4	21
Calculus	-		-		6	32	13	68
Principles of statistics	-		8	42	6	32	5	26
Application of statistics	-		8	42	5	26	6	32
Computer organization	-		-		11	58	8	42
Computer programing	-		-		11	58	8	42
Concepts and principles of physics	5	26	9	48	4	21	1	5

Table 103. Evaluation of social science course content--by education area of work, singlefield laboratory instruction--wood N = 19

Course	Essential N	Essential %	Important N	Important %	Desirable N	Desirable %	No Value N	No Value %
Economic principles, problems and policies	3	15	3	15	12	65	1	5
Structure and organization of trade unions	2	10	8	42	9	48	-	
Problems, policies and procedures in contemporary labor relations	1	6	8	42	8	42	2	10
Governmental functions and processes	4	21	5	26	9	48	1	5
Fundamental psychological concepts	6	32	8	42	5	26	-	
Principles of motivation and learning	11	59	6	31	2	10	-	
Psychological development of the individual	8	43	6	31	5	26	-	
Application of human learning principles to classroom situations	12	64	4	21	3	15	-	
Analysis of group, community, and cultural relations	5	26	8	43	5	26	1	5

Table 104. Evaluation of biological science course content--by education area of work, singlefield laboratory instruction--wood N = 19

Course	Essential N	Essential %	Important N	Important %	Desirable N	Desirable %	No Value N	No Value %
Organization and function of living systems	-		5	26	9	48	5	26
Physiology and anatomy of humans	1	5	5	26	6	32	7	37

Table 105. Evaluation of humanities course content--by education area of work, singlefield laboratory instruction--wood N = 19

Course	Essential N	Essential %	Important N	Important %	Desirable N	Desirable %	No Value N	No Value %
Social and cultural development of western civilization	2	10	5	27	9	47	3	16
Political, economic and social development of the United States	3	16	7	37	7	37	2	10

Table 106. Evaluation of communicative arts course content--by education area of work, singlefield laboratory instruction--wood N = 19

Course	Essential N	Essential %	Important N	Important %	Desirable N	Desirable %	No Value N	No Value %
Writing as a means to communicate ideas, judgements, observations, and other information	14	75	2	10	1	5	2	10
Reading and observations as a source of information	13	70	2	10	2	10	2	10
Principles of oral communications	16	85	1	5	1	5	1	5
Group communication problems and practices	12	64	6	31	-		1	5

Table 107. Evaluation of industrial education course content--by education area of work, singlefield laboratory instruction--wood N = 19

Course	Essential N	Essential %	Important N	Important %	Desirable N	Desirable %	No Value N	No Value %
Wood area								
Wood fabricating techniques	17	90	2	10	-		-	
Principles of building construction	11	59	6	31	2	10	-	
Chemical and physical properties of wood	7	38	6	31	6	31	-	
Processing of wood products	10	53	6	31	3	16	-	
Drafting area								
Principle elements of mechanical drafting	14	74	5	26	-		-	
Fundamentals of freehand drafting	13	70	3	15	3	15	-	
Architectural drafting conventions and techniques	7	37	8	42	4	21	-	
Spatial geometry (descriptive)	8	42	5	26	6	32	-	
Design principles	13	69	5	26	1	5	-	
Finishing area								
Materials, products, processing of finishing	14	74	4	21	1	5	-	
Electricity-electronics area								
Direct current circuit analysis	11	56	5	28	3	16	-	
Alternating current circuit analysis	11	56	4	22	4	22	-	
Familiarization with and practical application of modern electronic test equipment	9	47	4	21	6	32	-	
Theory and application of semi-conductor devices	4	22	6	31	9	47	-	
Television theory and service procedure	2	11	5	26	8	42	4	21
Electric motor theory and controls	4	21	9	47	6	32	-	
Theory and application of computer circuitry	2	11	3	16	9	47	5	26

Table 107 (Continued)

Course	Essential N	Essential %	Important N	Important %	Desirable N	Desirable %	No Value N	No Value %
Metals area								
Basic metal casting procedures	4	21	8	41	7	37	-	
Heat treating principles and techniques	5	27	10	52	4	21	-	
Use of metalworking tools	11	59	6	31	2	10	-	
Fundamental metal machine operations	7	37	8	41	3	16	1	6
Relationship between structure and properties of metals	6	31	5	27	8	42	-	
Principles and practices of sheet metal fabrication	10	52	4	21	5	27	-	
Welding ferrous and non-ferrous metals	9	46	5	27	5	27	-	
Fundamentals of metal spinning	1	5	2	10	12	64	4	21
Power mechanics area								
Sources, development, and application of power	10	52	6	31	3	17	-	
The automobile industry	4	21	9	47	6	32	-	
Operating principles of automobile components	8	42	7	37	4	21	-	
Service of automobile components	8	42	5	26	6	32	-	
Principles and applications of fluids (hydraulics)	4	21	6	31	8	42	1	6
Graphic arts area								
Fundamentals of design, finishing, and reproduction of printed materials	4	21	5	26	7	37	3	16
Techniques of quantity production of printed materials	2	10	3	16	10	52	4	21
Plastics area								
Chemical and physical properties of plastic resins	6	31	7	37	4	21	2	11
Plastics processing methods	6	31	8	42	3	16	2	11

Table 107 (Continued)

Course	Essential N	Essential %	Important N	Important %	Desirable N	Desirable %	No Value N	No Value %
General area								
Industrial education--its place in society	6	31	9	48	4	21	-	
Planning and layout of industrial shops, laboratories, and classroom facilities	12	63	7	37	-		-	
Initiating and maintaining effective safety programs	18	95	1	5	-		-	

Area unit industrial laboratory instruction There were thirteen classifications under area unit industrial laboratory instruction which were listed on the questionnaire. When the responses were counted, it was discovered that several classifications did not have frequencies of ten or more. It was decided to combine some of the related areas. This action resulted in the following four classifications--1. drafting, 2. electricity-electronics, 3. metals, and 4. automechanics.

Drafting By considering the rating scale as a two-point scale with categories 1 and 2 indicating 'Not needed' in the performance of the duties associated with a drafting unit laboratory, and categories 3 and 4 indicating 'Needed' content, it can be concluded that only three content areas--fundamentals of algebra, fundamentals of trigonometry, and principles of physics were considered 'Needed' by more than 50.0 percent. The remaining data in Table 109 represent the evaluations of the physical science and mathematics course content.

Table 108. Evaluation of industrial education course content, methods of teaching--by education area of work, singlefield laboratory instruction--wood N = 19

	Essential		Important		Desirable		Awareness needed		Not needed	
	N	%	N	%	N	%	N	%	N	%
Understanding the teacher's role in the profession	11	58	3	16	5	26	-		-	
Selecting and caring for equipment	11	58	7	37	1	5	-		-	
Understanding public relations	9	47	7	37	3	16	-		-	
Determining course content	16	85	2	10	1	5	-		-	
Developing courses	16	85	1	5	1	5	-		1	5
Planning daily lessons	11	59	5	26	1	5	2	10	-	
Evaluating student progress	12	64	5	26	1	6	1	6	-	
Preparing a budget	8	43	5	26	6	31	-		-	
Developing competency in the teaching act	11	59	6	31	2	10	-		-	

Table 110 serves to point out that psychological and learning principles were considered 'Needed' by the members of this area of work.

Tables 111 and 112 had no responses indicated in the 'Essential' category. The major percent of replies indicates biological science and humanities content was 'Not needed'.

Opinions of the value of communicative arts, as summarized in Table 113, indicate the content was 'Needed'.

The responses summarized in Table 114 indicate that most of the industrial education content was considered to be 'Needed' by more than 50.0 percent of those who replied. The content areas rated by a large percent to be 'Essential' were not numerous. Drafting and initiating and maintaining effective safety programs were notable exceptions.

Opinions represented by the data in Table 115 did not vary extensively from those of the other education classifications.

Table 109. Evaluation of physical science and mathematics course content--by education area of work, area unit laboratory instruction--drafting N = 12

Course	Essential N	Essential %	Important N	Important %	Desirable N	Desirable %	No Value N	No Value %
Organic chemistry	-		3	25	5	41	4	34
Inorganic chemistry	1	8	1	8	6	50	4	34
Fundamentals of algebra	4	34	3	25	5	41	-	
Fundamentals of trigonometry	4	34	3	25	3	25	2	16
Analytic geometry	2	16	4	34	3	25	3	25
Objectives and procedures of cost accounting	1	8	2	16	7	60	2	16
Calculus	-		1	8	5	42	6	50
Principles of statistics	-		3	25	7	59	2	16
Application of statistics	-		3	25	7	59	2	16
Computer organization	-		1	8	8	67	3	25
Computer programing	-		2	16	5	42	5	42
Concepts and principles of physics	5	42	5	42	2	16	-	

Table 110. Evaluation of social science course content--by education area of work, area unit laboratory instruction--drafting N = 12

Course	Essential N	Essential %	Important N	Important %	Desirable N	Desirable %	No Value N	No Value %
Economic principles, problems and policies	1	8	2	17	7	58	2	17
Structure and organization of trade unions	1	8	3	25	6	50	2	17
Problems, policies and procedures in contemporary labor relations	1	8	2	17	7	58	2	17
Governmental functions and processes	1	8	4	33	5	42	2	17
Fundamental psychological concepts	3	25	6	50	1	8	2	17
Principles of motivation and learning	7	58	4	34	-		1	8
Psychological development of the individual	7	58	4	34	-		1	8
Application of human learning principles to classroom situations	7	58	3	26	1	8	1	8
Analysis of group, community, and cultural relations	1	8	5	42	5	42	1	8

Table 111. Evaluation of biological science course content--by education area of work, area unit laboratory instruction--drafting N = 12

Course	Essential N	Essential %	Important N	Important %	Desirable N	Desirable %	No Value N	No Value %
Organization and function of living systems	-		2	17	6	50	4	33
Physiology and anatomy of humans	-		2	16	5	42	5	42

Table 112. Evaluation of humanities course content--by education area of work, area unit laboratory instruction--drafting N = 12

Course	Essential N	Essential %	Important N	Important %	Desirable N	Desirable %	No Value N	No Value %
Social and cultural development of western civilization	-		2	17	7	58	3	25
Political, economic and social development of the United States	-		5	42	4	33	3	25

Table 113. Evaluation of communicative arts course content--by education area of work, area unit laboratory instruction--drafting N = 12

Course	Essential N	Essential %	Important N	Important %	Desirable N	Desirable %	No Value N	No Value %
Writing as a means to communicate ideas, judgements, observations, and other information	3	25	9	75	-		-	
Reading and observations as a source of information	6	50	6	50	-		-	
Principles of oral communications	7	58	5	42	-		-	
Group communication problems and practices	7	58	3	25	2	17	-	

Table 114. Evaluation of industrial education course content--by education area of work, area unit laboratory instruction--drafting N = 12

Course	Essential N	Essential %	Important N	Important %	Desirable N	Desirable %	No Value N	No Value %
Wood area								
Wood fabricating techniques	4	33	5	42	1	8	2	17
Principles of building construction	6	50	3	25	2	17	1	8
Chemical and physical properties of wood	3	25	2	17	3	25	4	33
Processing of wood products	1	8	4	33	4	33	3	26
Drafting area								
Principle elements of mechanical drafting	10	84	1	8	1	8	-	
Fundamentals of freehand drafting	9	75	3	25	-		-	
Architectural drafting conventions and techniques	9	75	1	9	1	8	1	8
Spatial geometry (descriptive)	6	50	3	25	2	17	1	8
Design principles	8	66	4	34	-		-	
Finishing area								
Materials, products, processing of finishing	4	34	3	25	1	16	3	25
Electricity-electronics area								
Direct current circuit analysis	6	52	2	16	2	16	2	16
Alternating current circuit analysis	6	52	2	16	2	16	2	16
Familiarization with and practical application of modern electronic test equipment	7	60	1	8	2	16	2	16
Theory and application of semi-conductor devices	5	43	2	16	3	25	2	16
Television theory and service procedure	2	16	3	25	5	43	2	16
Electric motor theory and controls	2	16	5	43	3	25	2	16
Theory and application of computer circuitry	1	8	3	25	5	42	3	25

Table 114 (Continued)

Course	Essential N	Essential %	Important N	Important %	Desirable N	Desirable %	No Value N	No Value %
Metals area								
Basic metal casting procedures	3	25	5	42	3	25	1	8
Heat treating principles and techniques	5	42	1	8	3	25	3	25
Use of metalworking tools	5	42	3	25	3	25	1	8
Fundamental metal machine operations	7	59	1	8	3	25	1	8
Relationship between structure and properties of metals	3	25	1	8	5	42	3	25
Principles and practices of sheet metal fabrication	4	33	4	33	2	17	2	17
Welding ferrous and non-ferrous metals	4	33	-		6	50	2	17
Fundamentals of metal spinning	-		2	17	5	42	5	41
Power mechanics area								
Sources, development, and application of power	3	26	1	8	4	33	4	33
The automobile industry	2	17	3	25	3	25	4	33
Operating principles of automobile components	3	25	3	25	2	17	4	33
Service of automobile components	3	25	2	17	3	25	4	33
Principles and applications of fluids (hydraulics)	1	8	4	33	3	26	4	33
Graphic arts area								
Fundamentals of design, finishing, and reproduction of printed materials	2	17	4	33	3	25	3	25
Techniques of quantity production of printed materials	1	8	2	17	5	42	4	33
Plastics area								
Chemical and physical properties of plastic resins	2	17	5	42	1	8	4	33
Plastics processing methods	2	17	5	42	1	8	4	33

Table 114 (Continued)

Course	Essential N	Essential %	Important N	Important %	Desirable N	Desirable %	No Value N	No Value %
General area								
Industrial education--its place in society	2	17	6	49	2	17	2	17
Planning and layout of industrial shops, laboratories, and classroom facilities	7	58	1	8	3	26	1	8
Initiating and maintaining effective safety programs	9	75	2	17	1	8	-	

Electricity-electronics Algebra fundamentals, trigonometry fundamentals, analytic geometry, and principles of physics were rated 'Essential' or 'Important' by 94.0 percent, 88.0 percent, 67.0 percent, and 95.0 percent respectively. The remaining course content listed on Table 116 appears to have been 'Not needed' by the majority of electricity-electronics unit laboratory instructors. Psychological principles, learning concepts, and communicative arts also were ranked high in importance by the electricity-electronics respondents. The other content listed on Tables 117 through 120 was not ranked as high. The evaluation of the industrial education content, which is summarized in Table 121 indicates that while agreement seems to exist that electricity-electronics, drafting, and general industrial education content were necessary, the value of other content was not so apparent.

One element of methods of teaching, evaluating student progress, had a higher percent of 'Essential' responses than others. The remaining responses listed in Table 122 were similar to those of other education classifications.

Table 115. Evaluation of industrial education course content, methods of teaching--by education area of work, area unit laboratory instruction--mechanical drafting N = 12

	Essential		Important		Desirable		Awareness needed		Not needed	
	N	%	N	%	N	%	N	%	N	%
Understanding the teacher's role in the profession	5	42	3	25	3	25	-		1	8
Selecting and caring for equipment	9	75	3	25	-		-		-	
Understanding public relations	5	42	4	33	3	25	-		-	
Determining course content	9	75	3	25	-		-		-	
Developing courses	10	83	2	17	-		-		-	
Planning daily lessons	6	50	6	50	-		-		-	
Evaluating student progress	8	67	4	33	-		-		-	
Preparing a budget	6	50	3	25	2	17	1	8	-	
Developing competency in the teaching act	9	75	2	17	-		1	8	-	

Table 116. Evaluation of physical science and mathematics course content--by education area of work, area unit laboratory instruction--electricity-electronics N = 18

Course	Essential N	Essential %	Important N	Important %	Desirable N	Desirable %	No Value N	No Value %
Organic chemistry	-		4	22	9	50	5	28
Inorganic chemistry	2	11	3	16	12	67	1	6
Fundamentals of algebra	12	67	5	27	1	6	-	
Fundamentals of trigonometry	9	50	6	33	1	5	2	11
Analytic geometry	4	22	8	45	4	22	2	11
Objectives and procedures of cost accounting	2	11	4	22	5	28	7	39
Calculus	2	11	5	28	7	39	4	22
Principles of statistics	2	11	5	28	6	34	5	28
Application of statistics	2	11	3	16	8	45	5	28
Computer organization	1	6	7	39	7	39	3	16
Computer programing	-		8	45	7	39	3	16
Concepts and principles of physics	8	45	9	50	1	5	-	

Table 117. Evaluation of social science course content--by education area of work, area unit laboratory instruction--electricity-electronics N = 18

Course	Essential N	Essential %	Important N	Important %	Desirable N	Desirable %	No Value N	No Value %
Economic principles, problems and policies	1	6	6	33	8	44	3	17
Structure and organization of trade unions	1	6	6	33	9	50	2	11
Problems, policies and procedures in contemporary labor relations	1	6	3	17	11	60	3	17
Governmental functions and processes	1	6	6	33	7	39	4	22
Fundamental psychological concepts	6	33	9	50	2	11	1	6
Principles of motivation and learning	12	66	5	28	-		1	6
Psychological development of the individual	10	55	7	39	-		1	6
Application of human learning principles to classroom situations	14	77	3	17	-		1	6
Analysis of group, community, and cultural relations	3	17	6	33	8	44	1	6

Table 118. Evaluation of biological science course content--by education area of work, area unit laboratory instruction--electricity-electronics N = 18

Course	Essential N	Essential %	Important N	Important %	Desirable N	Desirable %	No Value N	No Value %
Organization and function of living systems	-		2	11	11	60	5	29
Physiology and anatomy of humans	-		2	11	6	34	10	55

Table 119. Evaluation of humanities course content--by education area of work, area unit laboratory instruction--electricity-electronics N = 18

Course	Essential N	Essential %	Important N	Important %	Desirable N	Desirable %	No Value N	No Value %
Social and cultural development of western civilization	-		2	11	11	62	5	27
Political, economic and social development of the United States	-		6	34	8	44	4	22

Table 120. Evaluation of communicative arts course content--by education area of work, area unit laboratory instruction--electricity-electronics N = 18

Course	Essential N	Essential %	Important N	Important %	Desirable N	Desirable %	No Value N	No Value %
Writing as a means to communicate ideas, judgements, observations, and other information	10	56	8	44	-		-	
Reading and observations as a source of information	12	66	6	34	-		-	
Principles of oral communications	13	73	5	27	-		-	
Group communication problems and practices	12	66	6	34	-		-	

Table 121. Evaluation of industrial education course content--by education area of work, area unit laboratory instruction--electricity-electronics N = 18

Course	Essential N	Essential %	Important N	Important %	Desirable N	Desirable %	No Value N	No Value %
Wood area								
Wood fabricating techniques	4	22	3	17	6	34	5	27
Principles of building construction	2	11	4	22	7	40	5	27
Chemical and physical properties of wood	3	16	2	10	7	40	6	34
Processing of wood products	2	12	5	27	5	27	6	34
Drafting area								
Principle elements of mechanical drafting	6	34	8	44	4	22	-	
Fundamentals of freehand drafting	5	26	9	50	3	16	1	6
Architectural drafting conventions and techniques	3	17	8	44	4	22	3	17
Spatial geometry (descriptive)	4	23	9	50	5	27	-	
Design principles	4	23	10	55	3	16	1	6
Finishing area								
Materials, products, processing of finishing	7	39	2	11	5	28	4	22
Electricity-electronics area								
Direct current circuit analysis	17	95	1	5	-		-	
Alternating current circuit analysis	17	95	1	5	-		-	
Familiarization with and practical application of modern electronic test equipment	17	95	1	5	-		-	
Theory and application of semi-conductor devices	16	89	2	11	-		-	
Television theory and service procedure	10	56	4	22	4	22	-	
Electric motor theory and controls	9	50	6	34	3	16	-	
Theory and application of computer circuitry	6	34	6	33	6	33	-	

Table 121 (Continued)

Course	Essential N	Essential %	Important N	Important %	Desirable N	Desirable %	No Value N	No Value %
Metals area								
Basic metal casting procedures	6	34	3	16	4	22	5	28
Heat treating principles and techniques	6	34	3	16	5	28	4	22
Use of metalworking tools	8	44	5	28	5	28	-	
Fundamental metal machine operations	9	50	2	12	7	38	-	
Relationship between structure and properties of metals	4	22	4	22	7	39	3	17
Principles and practices of sheet metal fabrication	6	34	6	33	5	28	1	5
Welding ferrous and non-ferrous metals	7	39	4	22	5	28	2	11
Fundamentals of metal spinning	-		4	22	6	34	8	44
Power mechanics area								
Sources, development, and application of power	6	33	6	33	1	6	5	28
The automobile industry	4	22	7	38	3	16	4	22
Operating principles of automobile components	6	34	5	28	4	22	3	16
Service of automobile components	5	28	6	34	2	10	5	28
Principles and applications of fluids (hydraulics)	1	6	8	44	5	28	4	22
Graphic arts area								
Fundamentals of design, finishing, and reproduction of printed materials	3	17	6	33	3	17	6	33
Techniques of quantity production of printed materials	2	11	4	22	5	28	7	39
Plastics area								
Chemical and physical properties of plastic resins	2	11	6	33	5	28	5	28
Plastics processing methods	2	11	6	33	4	23	6	33

Table 121 (Continued)

Course	Essential N	Essential %	Important N	Important %	Desirable N	Desirable %	No Value N	No Value %
General area								
Industrial education--its place in society	7	39	10	55	-		1	6
Planning and layout of industrial shops, laboratories, and classroom facilities	10	55	4	22	3	17	1	5
Initiating and maintaining effective safety programs	11	60	3	17	3	17	1	6

Metals In the general content evaluation data found in Tables 123 through 127, it can be seen that the opinions expressed by those in the metals unit laboratories did not vary much from those expressed by the respondents in the other areas.

In the industrial education content evaluations, Table 128, the ratings of drafting and metals indicate that these content areas were 'Needed'. It is also apparent that finishing, electricity, and plastics ranked high in the opinion of the metals unit laboratory instructors. Initiating and maintaining effective safety programs, although rated 'Essential' by 56.0 percent, was rated 'Not needed' by 37.0 percent.

Determining course content, and developing courses appear to have been outstanding in importance to the members of the metals classifications, with 95.0 percent and 100.0 percent 'Essential' replies reported in Table 129.

Table 122. Evaluation of industrial education course content, methods of teaching--by education area of work, area unit laboratory instruction--electricity-electronics N = 18

	Essential		Important		Desirable		Awareness needed		Not needed	
	N	%	N	%	N	%	N	%	N	%
Understanding the teacher's role in the profession	13	72	4	22	-		-		1	6
Selecting and caring for equipment	10	55	6	33	1	6	1	6	-	
Understanding public relations	9	50	6	33	3	17	-		-	
Determining course content	15	83	3	17	-		-		-	
Developing courses	13	72	5	28	-		-		-	
Planning daily lessons	9	50	7	37	2	13	-		-	
Evaluating student progress	17	94	1	6	-		-		-	
Preparing a budget	5	28	8	43	3	17	1	6	1	6
Developing competency in the teaching act	12	67	5	27	-		1	6	-	

Table 123. Evaluation of physical science and mathematics course content--by education area of work, area unit laboratory instruction--metals area combined N = 18

Course	Essential N	Essential %	Important N	Important %	Desirable N	Desirable %	No Value N	No Value %
Organic chemistry	-		5	28	8	44	5	28
Inorganic chemistry	-		6	33	10	56	2	11
Fundamentals of algebra	9	50	6	33	3	17	-	
Fundamentals of trigonometry	9	50	6	33	-		3	17
Analytic geometry	7	39	6	33	2	11	3	17
Objectives and procedures of cost accounting	-		4	22	10	56	4	22
Calculus	-		8	44	5	28	5	28
Principles of statistics	7	39	3	17	7	39	1	5
Application of statistics	4	23	7	39	6	33	1	5
Computer organization	-		7	39	11	61	-	
Computer programing	4	23	8	44	6	33	-	
Concepts and principles of physics	11	61	7	39	-		-	

Table 124. Evaluation of social science course content--by education area of work, area unit laboratory instruction--metals area combined N = 18

Course	Essential N	Essential %	Important N	Important %	Desirable N	Desirable %	No Value N	No Value %
Economic principles, problems and policies	-		7	39	7	39	4	22
Structure and organization of trade unions	3	17	8	44	4	22	3	17
Problems, policies and procedures in contemporary labor relations	3	17	7	39	7	39	1	5
Governmental functions and processes	4	22	4	22	8	44	2	12
Fundamental psychological concepts	1	5	12	67	5	28	-	
Principles of motivation and learning	8	45	10	55	-		-	
Psychological development of the individual	6	33	9	50	3	17	-	
Application of human learning principles to classroom situations	9	50	5	28	4	22	-	
Analysis of group, community, and cultural relations	2	11	11	61	3	17	2	11

Table 125. Evaluation of biological science course content--by education area of work, area unit laboratory instruction--metals area combined N = 18

Course	Essential N	Essential %	Important N	Important %	Desirable N	Desirable %	No Value N	No Value %
Organization and function of living systems	-		2	11	15	84	1	5
Physiology and anatomy of humans	3	17	4	21	9	50	2	11

Table 126. Evaluation of humanities course content--by education area of work, area unit laboratory instruction--metals area combined N = 18

Course	Essential N	Essential %	Important N	Important %	Desirable N	Desirable %	No Value N	No Value %
Social and cultural development of western civilization	-		3	17	11	61	4	22
Political, economic and social development of the United States	-		11	61	6	34	1	5

Table 127. Evaluation of communicative arts course content--by education area of work, area unit laboratory instruction--metals area combined N = 18

Course	Essential N	Essential %	Important N	Important %	Desirable N	Desirable %	No Value N	No Value %
Writing as a means to communicate ideas, judgements, observations, and other information	6	33	9	50	-		3	17
Reading and observations as a source of information	9	50	6	33	3	17	-	
Principles of oral communications	14	78	4	22	-		-	
Group communication problems and practices	13	72	5	28	-		-	

Table 128. Evaluation of industrial education course content--by education area of work, area unit laboratory instruction--metals area combined N = 18

Course	Essential N	Essential %	Important N	Important %	Desirable N	Desirable %	No Value N	No Value %
Wood area								
Wood fabricating techniques	6	33	5	28	6	33	1	5
Principles of building construction	4	23	7	39	6	33	1	5
Chemical and physical properties of wood	5	28	1	5	8	44	4	23
Processing of wood products	3	15	7	39	4	23	4	23
Drafting area								
Principle elements of mechanical drafting	12	67	5	28	1	5	-	
Fundamentals of freehand drafting	13	71	2	11	3	17	-	
Architectural drafting conventions and techniques	9	50	2	10	3	17	4	23
Spatial geometry (descriptive)	11	62	2	11	4	23	1	5
Design principles	13	72	5	28	-		-	
Finishing area								
Materials, products, processing of finishing	9	50	5	28	3	17	1	5
Electricity-electronics area								
Direct current circuit analysis	12	67	6	33	-		-	
Alternating current circuit analysis	12	67	6	33	-		-	
Familiarization with and practical application of modern electronic test equipment	14	78	4	22	-		-	
Theory and application of semi-conductor devices	10	66	4	22	4	22	-	
Television theory and service procedure	5	28	5	28	5	28	3	16
Electric motor theory and controls	1	5	12	67	2	11	3	17
Theory and application of computer circuitry	5	28	9	50	4	22	-	

Table 128 (Continued)

Course	Essential N	Essential %	Important N	Important %	Desirable N	Desirable %	No Value N	No Value %
Metals area								
Basic metal casting procedures	12	66	3	17	3	17	-	
Heat treating principles and techniques	13	73	1	5	1	5	3	17
Use of metalworking tools	16	89	2	11	-		-	
Fundamental metal machine operations	18	100	-		-		-	
Relationship between structure and properties of metals	10	73	2	11	1	5	2	11
Principles and practices of sheet metal fabrication	11	62	1	5	6	33	-	
Welding ferrous and non-ferrous metals	10	73	3	17	5	10	-	
Fundamentals of metal spinning	-		3	17	11	62	4	21
Power mechanics area								
Sources, development, and application of power	6	34	4	22	4	22	4	22
The automobile industry	4	22	4	22	6	34	4	22
Operating principles of automobile components	5	27	3	17	6	34	4	22
Service of automobile components	4	22	1	5	6	33	7	40
Principles and applications of fluids (hydraulics)	6	33	11	62	1	5	-	
Graphic arts area								
Fundamentals of design, finishing, and reproduction of printed materials	3	17	10	57	5	26	-	
Techniques of quantity production of printed materials	3	17	6	33	7	39	2	11
Plastics area								
Chemical and physical properties of plastic resins	7	39	7	39	4	17	1	5
Plastics processing methods	7	39	7	39	3	17	1	5

Table 128 (Continued)

Course	Essential N	Essential %	Important N	Important %	Desirable N	Desirable %	No Value N	No Value %
General area								
Industrial education--its place in society	8	45	9	50	1	5	-	
Planning and layout of industrial shops, laboratories, and classroom facilities	13	73	4	22	1	5	-	
Initiating and maintaining effective safety programs	10	56	1	5	4	22	3	17

Auto mechanics The responses of the graduates who classified themselves area unit laboratory instruction--auto mechanics compared with the responses of those in the other classifications. The ratings indicate that algebra, trigonometry, physics, psychology, and the communicative arts were considered 'Needed'. The other content areas were rated by most in a manner which indicated that they were 'Not needed' to perform satisfactorily in the auto mechanics unit laboratory. Percents and frequencies of replies can be seen in Tables 130 through 134.

The evaluation of industrial education content, the summary of which is found in Table 135, makes it apparent that electricity and metals were considered as important to the auto mechanics instructor as the content dealing directly with power and auto mechanics.

Elements of methods of teaching were all rated 'Essential' or 'Important by the greatest percent who replied to that part of the questionnaire. These data are found in Table 136.

Table 129. Evaluation of industrial education course content, methods of teaching--by education area of work, area unit laboratory instruction--metals area combined N = 18

	Essential		Important		Desirable		Awareness needed		Not needed	
	N	%	N	%	N	%	N	%	N	%
Understanding the teacher's role in the profession	4	22	7	44	7	44	-		-	
Selecting and caring for equipment	10	55	5	28	3	17	-		-	
Understanding public relations	10	54	4	23	4	23	-		-	
Determining course content	17	95	1	5	-		-		-	
Developing courses	18	100	-		-		-		-	
Planning daily lessons	15	83	3	17	-		-		-	
Evaluating student progress	14	77	4	23	-		-		-	
Preparing a budget	8	45	6	33	4	23	-		-	
Developing competency in the teaching act	11	60	7	40	-		-		-	

Table 130. Evaluation of physical science and mathematics course content--by education area of work, area unit laboratory instruction--auto mechanics N = 17

Course	Essential N	Essential %	Important N	Important %	Desirable N	Desirable %	No Value N	No Value %
Organic chemistry	-		5	30	9	52	3	18
Inorganic chemistry	2	12	3	18	10	58	2	12
Fundamentals of algebra	9	52	4	24	4	24	-	
Fundamentals of trigonometry	7	41	4	24	5	29	1	6
Analytic geometry	3	18	4	24	6	34	4	24
Objectives and procedures of cost accounting	1	7	4	25	6	34	6	34
Calculus	-		4	24	4	24	9	52
Principles of statistics	1	6	4	24	8	46	4	24
Application of statistics	1	6	4	24	7	41	5	29
Computer organization	-		2	12	8	46	7	42
Computer programing	-		2	12	7	42	8	46
Concepts and principles of physics	10	58	7	42	-		-	

Table 131. Evaluation of social science course content--by education area of work, area unit laboratory instruction--auto mechanics N = 17

Course	Essential N	Essential %	Important N	Important %	Desirable N	Desirable %	No Value N	No Value %
Economic principles; Problems and policies	2	12	4	24	10	58	1	6
Structure and organization of trade unions	2	12	8	47	6	35	1	6
Problems, policies and procedures in contemporary labor relations	2	12	7	41	6	35	2	12
Governmental functions and processes	4	24	5	29	7	41	1	6
Fundamental psychological concepts	8	47	5	29	4	24	-	
Principles of motivation and learning	9	53	8	47	-		-	
Psychological development of the individual	9	53	8	47	-		-	
Application of human learning principles to classroom situations	7	41	7	41	3	18	-	
Analysis of group, community, and cultural relations	2	12	8	47	7	41	-	

Table 132. Evaluation of biological science course content--by education area of work, area unit laboratory instruction--auto mechanics N = 17

Course	Essential N	Essential %	Important N	Important %	Desirable N	Desirable %	No Value N	No Value %
Organization and function of living systems	-		3	18	11	64	3	18
Physiology and anatomy of humans	-		3	18	11	64	3	18

Table 133. Evaluation of humanities course content--by education area of work, area unit laboratory instruction--auto mechanics N = 17

Course	Essential N	Essential %	Important N	Important %	Desirable N	Desirable %	No Value N	No Value %
Social and cultural development of western civilization	1	6	3	18	10	58	3	18
Political, economic and social development of the United States	1	6	8	47	8	47	-	

Table 134. Evaluation of communicative arts course content--by education area of work, area unit laboratory instruction--auto mechanics N = 17

Course	Essential N	Essential %	Important N	Important %	Desirable N	Desirable %	No Value N	No Value %
Writing as a means to communicate ideas, judgements, observations, and other information	8	47	8	47	1	6	-	
Reading and observations as a source of information	10	58	6	36	1	6	-	
Principles of oral communications	14	82	2	12	1	6	-	
Group communication problems and practices	13	76	3	18	1	6	-	

Table 135. Evaluation of industrial education course content--by education area of work, area unit laboratory instruction--auto mechanics N = 17

Course	Essential N	Essential %	Important N	Important %	Desirable N	Desirable %	No Value N	No Value %
Wood area								
Wood fabricating techniques	3	18	6	35	7	41	1	6
Principles of building construction	4	24	4	23	6	35	3	18
Chemical and physical properties of wood	1	6	5	29	9	53	2	12
Processing of wood products	1	6	7	41	7	41	2	12
Drafting area								
Principle elements of mechanical drafting	8	48	7	40	2	12	-	
Fundamentals of free hand drafting	5	28	10	60	1	6	1	6
Architectural drafting conventions and techniques	3	18	6	36	7	40	1	6
Spatial geometry (descriptive)	2	12	9	52	4	24	2	12
Design principles	4	24	9	52	4	24	-	
Finishing area								
Materials, products, processing of finishing	7	40	6	36	3	18	1	6
Electricity-electronics area								
Direct current circuit analysis	15	88	2	12	-		-	
Alternating current circuit analysis	14	82	3	18	-		-	
Familiarization with and practical application of modern electronic test equipment	14	82	3	18	-		-	
Theory and application of semi-conductor devices	8	47	7	41	2	12	-	
Television theory and service procedure	3	18	3	18	10	58	1	6
Electric motor theory and controls	9	53	6	35	2	12	-	
Theory and application of computer circuitry	-		2	12	13	76	2	12

Table 135 (Continued)

Course	Essential N	Essential %	Important N	Important %	Desirable N	Desirable %	No Value N	No Value %
Metals area								
Basic metal casting procedures	5	29	7	42	5	29	-	
Heat treating principles and techniques	8	47	7	41	2	12	-	
Use of metalworking tools	12	71	4	23	1	6	-	
Fundamental metal machine operations	13	77	3	17	1	6	-	
Relationship between structure and properties of metals	6	35	8	47	3	18	-	
Principles and practices of sheet metal fabrication	8	47	6	35	3	18	-	
Welding ferrous and non-ferrous metals	10	59	4	23	3	18	-	
Fundamentals of metal spinning	-		6	35	11	65	-	
Power mechanics area								
Sources, development, and application of power	11	66	4	23	2	11	-	
The automobile industry	13	77	4	23	-		-	
Operating principles of automobile components	14	82	3	18	-		-	
Service of automobile components	13	77	4	23	-		-	
Principles and applications of fluids (hydraulics)	7	41	8	47	1	6	1	6
Graphic arts area								
Fundamentals of design, finishing, and reproduction of printed materials	1	6	3	18	10	58	3	18
Techniques of quantity production of printed materials	1	6	2	12	9	53	5	29
Plastics area								
Chemical and physical properties of plastic resin	2	11	6	36	7	42	2	11
Plastics processing methods	1	6	8	47	6	36	2	11

Table 135 (Continued)

Course	Essential N	Essential %	Important N	Important %	Desirable N	Desirable %	No Value N	No Value %
General area								
Industrial education--its place in society	8	47	7	41	2	12	-	
Planning and layout of industrial shops, laboratories, and classroom facilities	11	65	4	24	2	11	-	
Initiating and maintaining effective safety programs	13	78	2	11	2	11	-	

Non-industrial laboratory instruction Professional subjects, related subjects, guidance and/or counseling, and other were the classifications listed under non-industrial laboratory instruction. Those who indicated 'Other' were asked to specify what was meant by other. Driver education was listed by five respondents. Mathematics was listed by four respondents. Science, physics, religion, and audio-visual instruction were also listed. The response percentages which are listed in Tables 137 through 143 are very similar to the percentages found in Tables 32 through 39, which are the evaluations by education occupational classification.

Administration It becomes apparent by examining the evaluation data found in Tables 144 through 150 that the needs of the graduates employed in the administration area of work differed from the needs of those in the instruction area of work. Objectives and procedures of cost accounting, as seen in Table 144, was ranked 'Essential' or 'Important' by 62.0 percent of

Table 136. Evaluation of industrial education course content, methods of teaching--by education area of work, area unit laboratory instruction--auto mechanics N = 17

	Essential		Important		Desirable		Awareness needed		Not needed	
	N	%	N	%	N	%	N	%	N	%
Understanding the teacher's role in the profession	10	64	3	18	2	12	1	6	-	
Selecting and caring for equipment	11	74	6	36	-		-		-	
Understanding public relations	10	60	7	40	-		-		-	
Determining course content	14	82	3	18	-		-		-	
Developing courses	14	82	3	18	-		-		-	
Planning daily lessons	8	47	8	47	1	6	-		-	
Evaluating student progress	13	76	3	18	1	6	-		-	
Preparing a budget	7	40	8	48	2	12	-		-	
Developing competency in the teaching act	10	60	7	40	-		-		-	

Table 137. Evaluation of physical science and mathematics course content--by education area of work, non-industrial laboratory instruction N = 20

Course	Essential N	Essential %	Important N	Important %	Desirable N	Desirable %	No Value N	No Value %
Organic chemistry	-		3	15	10	50	7	35
Inorganic chemistry	-		6	30	9	45	5	25
Fundamentals of algebra	8	40	5	25	6	30	1	5
Fundamentals of trigonometry	6	30	7	35	5	25	2	10
Analytic geometry	3	15	6	30	8	40	3	15
Objectives and procedures of cost accounting	-		6	30	13	65	1	5
Calculus	1	5	4	20	9	45	6	30
Principles of statistics	3	15	4	20	12	60	1	5
Application of statistics	3	15	6	30	8	40	3	15
Computer organization	-		5	25	12	60	3	15
Computer programing	-		7	35	10	50	3	15
Concepts and principles of physics	7	35	6	30	6	30	1	5

Table 138. Evaluation of social science course content--by education area of work, non-industrial laboratory instruction N = 20

Course	Essential N	Essential %	Important N	Important %	Desirable N	Desirable %	No Value N	No Value %
Economic principles, problems and policies	1	5	8	40	7	35	-	
Structure and organization of trade unions	5	25	5	25	10	50	-	
Problems, policies and procedures in contemporary labor relations	4	20	5	25	7	35	4	20
Governmental functions and processes	5	25	8	40	5	25	2	10
Fundamental psychological concepts	8	40	9	45	2	10	1	5
Principles of motivation and learning	12	60	7	35	-		1	5
Psychological development of the individual	11	55	7	35	1	5	1	5
Application of human learning principles to classroom situations	13	65	5	25	1	5	1	5
Analysis of group, community, and cultural relations	8	40	5	25	6	30	1	5

Table 139. Evaluation of biological science course content--by education area of work, non-industrial laboratory instruction N = 20

Course	Essential N	Essential %	Important N	Important %	Desirable N	Desirable %	No Value N	No Value %
Organization and function of living systems	1	5	4	20	10	50	5	25
Physiology and anatomy of humans	1	5	2	10	12	60	5	25

Table 140. Evaluation of humanities course content--by education area of work, non-industrial laboratory instruction N = 20

Course	Essential N	Essential %	Important N	Important %	Desirable N	Desirable %	No Value N	No Value %
Social and cultural development of western civilization	1	5	-		14	70	5	25
Political, economic and social development of the United States	1	5	5	25	13	65	1	5

Table 141. Evaluation of communicative arts course content--by education area of work, non-industrial laboratory instruction N = 20

Course	Essential N	Essential %	Important N	Important %	Desirable N	Desirable %	No Value N	No Value %
Writing as a means to communicate ideas, judgements, observations, and other information	11	55	6	30	3	15	-	
Reading and observations as a source of information	12	60	5	25	3	15	-	
Principles of oral communications	13	65	4	20	3	15	-	
Group communication problems and practices	12	60	4	20	4	20	-	

Table 142. Evaluation of industrial education course content--by education area of work, non-industrial laboratory instruction N = 20

Course	Essential N	Essential %	Important N	Important %	Desirable N	Desirable %	No Value N	No Value %
Wood area								
Wood fabricating techniques	5	25	5	25	8	40	2	10
Principles of building construction	6	30	6	30	6	30	2	10
Chemical and physical properties of wood	5	25	3	15	10	50	2	10
Processing of wood products	4	20	5	25	8	40	3	15
Drafting area								
Principle elements of mechanical drafting	10	50	7	35	3	15	-	
Fundamentals of freehand drafting	6	30	8	40	6	30	-	
Architectural drafting conventions and techniques	8	40	5	25	6	30	1	5
Spatial geometry (descriptive)	6	30	8	40	6	30	-	
Design principles	7	35	8	40	5	25	-	
Finishing area								
Materials, products, processing of finishing	8	40	7	35	4	20	1	5
Electricity-electronics area								
Direct current circuit analysis	11	55	5	25	3	15	1	5
Alternating current circuit analysis	11	55	5	25	3	15	1	5
Familiarization with and practical application of modern electronic test equipment	10	50	6	30	2	10	2	10
Theory and application of semi-conductor devices	6	30	7	35	4	20	3	15
Television theory and service procedure	6	30	7	35	2	10	4	20
Electric motor theory and controls	6	30	8	40	4	20	2	10
Theory and application of computer circuitry	5	25	2	10	9	45	4	20

Table 142 (Continued)

Course	Essential N	Essential %	Important N	Important %	Desirable N	Desirable %	No Value N	No Value %
Metals area								
Basic metal casting procedures	9	45	6	30	4	20	1	5
Heat treating principles and techniques	8	40	7	35	4	20	1	5
Use of metalworking tools	12	60	4	20	4	20	-	
Fundamental metal machine operations	14	70	3	15	3	15	-	
Relationship between structure and properties of metals	7	35	8	40	4	20	1	5
Principles and practices of sheet metal fabrication	6	30	8	40	6	30	-	
Welding ferrous and non-ferrous metals	8	40	7	35	5	25	-	
Fundamentals of metal spinning	2	10	3	15	10	50	5	25
Power mechanics area								
Sources, development, and application of power	7	35	9	45	2	10	2	10
The automobile industry	9	45	5	25	3	15	3	15
Operating principles of automobile components	10	50	3	15	5	25	2	10
Service of automobile components	10	50	3	15	3	15	4	20
Principles and applications of fluids (hydraulics)	8	40	5	25	6	30	1	5
Graphic arts								
Fundamentals of design, finishing, and reproduction of printed materials	1	5	4	20	10	50	5	25
Techniques of quantity production of printed materials	4	20	4	20	9	45	3	15
Plastics area								
Chemical and physical properties of plastic resins	3	15	5	25	8	40	4	20
Plastics processing methods	3	15	6	30	8	40	3	15

Table 142 (Continued)

Course	Essential N	Essential %	Important N	Important %	Desirable N	Desirable %	No Value N	No Value %
General area								
Industrial education--its place in society	7	35	9	45	4	20	-	
Planning and layout of industrial shops, laboratories, and classroom facilities	7	35	10	50	3	15	-	
Initiating and maintaining effective safety programs	11	55	8	40	1	5	-	

those who replied. The content area, economic principles, problems and policies, which is listed in Table 145, was also apparently needed by a strong majority. Sixty-six percent ranked that either 'Essential' or 'Important'.

As might be expected, those in administration did not consider wood course content to be as necessary as the respondents in the other education classifications. The percent of 'Essential' replies in the area of electricity indicates that many administrators rated this content valuable to their position.

Preparing a budget, one of the elements of methods of teaching listed in Table 150, was rated 'Essential' by 72.0 percent. It would be expected that preparing budgets would be of greater importance to administrators.

Table 143. Evaluation of industrial education course content, methods of teaching--by education area of work, non-industrial laboratory instruction N = 20

	Essential		Important		Desirable		Awareness needed		Not needed	
	N	%	N	%	N	%	N	%	N	%
Understanding the teacher's role in the profession	10	50	7	35	3	15	-		-	
Selecting and caring for equipment	12	60	8	40	-		-		-	
Understanding public relations	10	50	7	35	3	15	-		-	
Determining course content	13	65	7	35	-		-		-	
Developing courses	13	65	6	30	1	5	-		-	
Planning daily lessons	13	65	5	25	2	10	-		-	
Evaluating student progress	14	70	4	20	2	10	-		-	
Preparing a budget	6	30	9	45	4	20	1	5	-	
Developing competency in the teaching act	13	65	5	25	1	5	1	5	-	

Table 144. Evaluation of physical science and mathematics course content--by education area of work, administration N = 18

Course	Essential N	Essential %	Important N	Important %	Desirable N	Desirable %	No Value N	No Value %
Organic chemistry	1	5	3	17	12	67	2	11
Inorganic chemistry	1	5	3	17	12	67	2	11
Fundamentals of algebra	5	28	9	50	4	22	-	
Fundamentals of trigonometry	5	28	7	39	5	28	1	5
Analytic geometry	3	17	7	39	6	33	2	11
Objectives and procedures of cost accounting	4	23	7	39	6	33	1	5
Calculus	-		4	23	4	23	10	54
Principles of statistics	4	23	5	28	8	44	1	5
Application of statistics	5	27	4	23	9	50	-	
Computer organization	2	11	5	28	8	44	3	17
Computer programing	3	17	5	27	6	33	4	23
Concepts and principles of physics	5	28	8	44	3	17	2	11

Table 145. Evaluation of social science course content--by education area of work, administration N = 18

Course	Essential N	Essential %	Important N	Important %	Desirable N	Desirable %	No Value N	No Value %
Economic principles, problems and policies	2	11	10	55	5	29	1	5
Structure and organization of trade unions	7	39	3	17	7	39	1	5
Problems, policies and procedures in contemporary labor relations	4	23	6	33	8	44	-	
Governmental functions and processes	4	23	5	27	7	39	2	11
Fundamental psychological concepts	8	44	6	33	3	17	1	6
Principles of motivation and learning	13	72	4	23	-		1	5
Psychological development of the individual	10	57	6	33	1	5	1	5
Application of human learning principles to classroom situations	11	62	5	27	2	11	-	
Analysis of group, community, and cultural relations	4	22	9	50	4	22	1	6

Table 146. Evaluation of biological science course content--by education area of work, administration N = 18

Course	Essential N	Essential %	Important N	Important %	Desirable N	Desirable %	No Value N	No Value %
Organization and function of living systems	3	17	7	39	8	44	-	
Physiology and anatomy of humans	2	11	3	17	12	67	1	5

Table 147. Evaluation of humanities course content--by education area of work, administration N = 18

Course	Essential N	Essential %	Important N	Important %	Desirable N	Desirable %	No Value N	No Value %
Social and cultural development of western civilization	2	11	4	23	10	55	2	11
Political, economic and social development of the United States	2	10	8	45	8	45	-	

Table 148. Evaluation of communicative arts course content--by education area of work, administration N = 18

Course	Essential N	Essential %	Important N	Important %	Desirable N	Desirable %	No Value N	No Value %
Writing as a means to communicate ideas, judgements, observations, and other information	10	55	5	29	2	11	1	5
Reading and observations as a source of information	7	36	7	36	4	22	-	
Principles of oral communications	12	66	5	29	1	5	-	
Group communication problems and practices	11	60	4	23	3	17	-	

Table 149. Evaluation of industrial education course content--by education area of work, administration N = 18

Course	Essential N	Essential %	Important N	Important %	Desirable N	Desirable %	No Value N	No Value %
Wood area								
Wood fabricating techniques	6	33	3	17	7	39	2	11
Principles of building construction	6	33	4	23	6	33	2	11
Chemical and physical properties of wood	2	11	4	23	8	43	4	23
Processing of wood products	3	17	4	23	8	43	3	17
Drafting area								
Principle elements of mechanical drafting	7	39	6	33	4	23	1	5
Fundamentals of freehand drafting	8	44	8	44	2	12	-	
Architectural drafting conventions and techniques	6	33	6	33	5	29	1	5
Spatial geometry (descriptive)	2	11	8	45	7	39	1	5
Design principles	5	29	9	58	4	23	-	
Finishing area								
Materials, products, processing of finishing	5	28	4	22	7	39	2	11
Electricity-electronics area								
Direct current circuit analysis	10	55	2	11	5	29	1	5
Alternating current circuit analysis	10	55	3	17	4	23	1	5
Familiarization with and practical application of modern electronic test equipment	7	37	5	29	4	23	2	11
Theory and application of semi-conductor devices	8	45	4	23	3	16	3	16
Television theory and service procedure	9	50	2	11	4	23	3	16
Electric motor theory and controls	4	22	6	33	5	29	3	16
Theory and application of computer circuitry	2	11	6	33	7	40	3	16

Table 149 (Continued)

Course	Essential N	Essential %	Important N	Important %	Desirable N	Desirable %	No Value N	No Value %
Metals area								
Basic metal casting procedures	5	29	3	17	7	37	3	17
Heat treating principles and techniques	5	29	4	21	6	33	3	17
Use of metalworking tools	9	50	4	21	3	17	2	12
Fundamental metal machine operations	10	57	2	11	4	21	2	11
Relationship between structure and properties of metals	3	17	8	44	5	28	2	11
Principles and practices of sheet metal fabrication	7	39	5	28	5	28	1	5
Welding ferrous and non-ferrous metals	6	33	7	39	3	17	2	11
Fundamentals of metal spinning	1	5	3	17	9	50	5	28
Power mechanics area								
Sources, development, and application of power	5	28	5	28	4	22	4	22
The automobile industry	3	17	5	28	6	33	4	22
Operating principles of automobile components	4	22	6	33	4	22	4	22
Service of automobile components	4	22	4	22	6	33	4	22
Principles and applications of fluids (hydraulics)	3	17	6	33	7	39	2	11
Graphic arts area								
Fundamentals of design, finishing, and reproduction of printed materials	1	5	5	28	8	45	4	22
Techniques of quantity production of printed materials	4	22	4	22	10	54	-	
Plastics area								
Chemical and physical properties of plastic resins	2	11	4	22	9	50	3	17
Plastics processing methods	2	11	4	22	9	50	3	17

Table 149 (Continued)

Course	Essential N	Essential %	Important N	Important %	Desirable N	Desirable %	No Value N	No Value %
General area								
Industrial education--its place in society	6	33	7	39	4	23	1	5
Planning and layout of industrial shops, laboratories, and classroom facilities	7	39	7	39	2	11	2	11
Initiating and maintaining effective safety programs	7	39	5	28	5	28	1	5

Industry occupational classification

Tables 151 through 156 represent the evaluations of course content by those who classified themselves in the major occupational classification--industry.

Underscored values, which represent the greatest percentage of replies for each evaluation, are found in the 'Essential' category for the two content areas fundamentals of algebra and fundamentals of trigonometry. Most other major percentages can be seen in the 'Desirable' category. Further examination of the data in Table 151 reveals that the three areas--organic chemistry, inorganic chemistry, and calculus--were considered 'Not needed' by over 87.0 percent, 79.0 percent, and 81.0 percent, respectively, of those who responded.

The data in Table 152 represent opinions more evenly divided. In only one content area, application of human learning principles to classroom situations, did a large majority indicate the content to be 'Not needed'.

Table 150. Evaluation of industrial education course content, methods of teaching--by education area of work, administration N = 18

	Essential		Important		Desirable		Awareness needed		Not needed	
	N	%	N	%	N	%	N	%	N	%
Understanding the teacher's role in the profession	12	67	1	5	3	17	2	11	-	
Selecting and caring for equipment	11	61	3	17	2	11	2	11	-	
Understanding public relations	11	61	6	33	1	6	-		-	
Determining course content	14	78	3	17	-		1	5	-	
Developing courses	15	84	2	11	-		1	5	-	
Planning daily lessons	11	61	3	17	3	17	1	5	-	
Evaluating student progress	14	78	3	17	-		1	5	-	
Preparing a budget	13	72	3	17	-		2	11	-	
Developing competency in the teaching act	17	95	1	5	-		-		-	

As indicated by the data in Tables 153 and 154, agreement apparently existed that biological sciences and humanities were not considered 'Needed' by very many of the industry graduates.

The great importance that was placed on the communicative arts is apparent from the data in Table 155. The survey revealed that 95.0 percent of these respondents considered writing skills necessary to their position. The other communicative skills were rated 'Essential' or 'Important' by more than 85.0 percent of the industry respondents.

Most industrial education core courses were rated 'Desirable' or 'No value' by the major number of respondents of the industry classification. Mechanical drafting, freehand drafting, and initiating and maintaining effective safety programs were the only content areas rated 'Essential' or 'Important' by more than 60.0 percent.

Table 151. Evaluation of physical science and mathematics course content--by industry occupational classification N = 135

Course	Essential N	Essential %	Important N	Important %	Desirable N	Desirable %	No Value N	No Value %
Organic chemistry	4	2.9	13	9.7	51	37.8	67	49.6
Inorganic chemistry	5	3.8	23	17.0	61	45.2	46	34.0
Fundamentals of algebra	52	38.6	44	32.5	33	24.5	6	4.4
Fundamentals of trigonometry	43	31.9	39	28.9	42	31.1	11	8.1
Analytic geometry	30	22.2	33	24.5	47	34.8	25	18.5
Objectives and procedures of cost accounting	28	20.8	50	37.0	47	34.8	10	7.4
Calculus	7	5.2	18	13.4	57	42.2	53	39.2
Principles of statistics	17	12.6	41	30.3	55	40.7	22	16.4
Application of statistics	16	11.9	40	29.6	56	41.5	23	17.0
Computer organization	20	14.8	35	25.9	52	38.5	28	20.6
Computer programing	15	11.2	29	21.5	53	39.3	38	28.0
Concepts and principles of physics	34	25.2	45	33.3	48	35.6	8	5.9

Table 152. Evaluation of social science course content--by industry occupational classification N = 135

Course	Essential N	Essential %	Important N	Important %	Desirable N	Desirable %	No Value N	No Value %
Economic principles, problems and policies	18	13.4	58	42.9	49	36.3	10	7.4
Structure and organization of trade unions	20	14.9	46	34.0	49	36.3	20	14.8
Problems, policies and procedures in contemporary labor relations	21	15.5	48	35.6	49	36.3	17	12.6
Governmental functions and processes	18	13.4	39	28.6	61	45.1	16	11.9
Fundamental psychological concepts	31	22.9	46	34.2	45	33.3	13	9.6
Principles of motivation and learning	38	28.3	47	34.8	37	27.3	13	9.6
Psychological development of the individual	20	14.8	39	28.8	58	43.0	18	13.4
Application of human learning principles to classroom situations	15	11.2	20	14.8	50	37.0	50	37.0
Analysis of group, community, and cultural relations	12	8.9	38	28.0	66	48.9	19	14.2

Table 153. Evaluation of biological science course content--by industry occupational classification N = 135

Course	Essential N	Essential %	Important N	Important %	Desirable N	Desirable %	No Value N	No Value %
Organization and function of living systems	2	1.6	15	11.1	43	31.8	75	55.5
Physiology and anatomy of humans	5	3.8	12	8.9	45	33.3	73	54.0

Table 154. Evaluation of humanities course content--by industry occupational classification N = 135

Course	Essential N	Essential %	Important N	Important %	Desirable N	Desirable %	No Value N	No Value %
Social and cultural development of western civilization	1	.7	13	9.7	60	44.4	61	45.2
Political, economic and social development of the United States	3	2.2	32	23.8	70	51.8	30	22.2

Table 155. Evaluation of communicative arts course content--by industry occupational classification N = 135

Course	Essential N	Essential %	Important N	Important %	Desirable N	Desirable %	No Value N	No Value %
Writing as a means to communicate ideas, judgements, observations, and other information	101	75.0	28	20.7	4	2.9	2	1.4
Reading and observations as a source of information	94	69.7	30	22.2	9	6.7	2	1.4
Principles of oral communications	96	71.2	31	22.9	7	5.2	1	.7
Group communication problems and practices	79	58.5	37	27.4	16	11.9	2	2.2

Table 156. Evaluation of industrial education course content--by industry occupational classification N = 135

Course	Essential N	Essential %	Important N	Important %	Desirable N	Desirable %	No Value N	No Value %
Wood area								
Wood fabricating techniques	9	6.7	14	10.4	60	44.4	52	38.5
Principles of building construction	16	11.9	19	14.1	59	43.7	41	30.3
Chemical and physical properties of wood	8	5.9	11	8.2	51	37.8	65	48.1
Processing of wood products	10	7.5	6	4.4	54	40.0	65	48.1

Table 156 (Continued)

Course	Essential N	Essential %	Important N	Important %	Desirable N	Desirable %	No Value N	No Value %
Drafting area								
Principle elements of mechanical drafting	54	40.0	43	31.8	33	24.5	5	3.7
Fundamentals of freehand drafting	40	29.6	43	31.8	40	29.6	12	9.0
Architectural drafting conventions and techniques	20	14.8	23	17.0	57	42.3	35	25.9
Spatial geometry (descriptive)	33	24.5	34	25.1	47	34.8	21	15.5
Design principles	38	28.2	36	26.6	52	38.5	9	6.7
Finishing area								
Materials, products, processing of finishing	27	20.0	32	23.8	40	29.6	36	26.6
Electricity-electronics area								
Direct current circuit analysis	25	18.5	35	25.9	50	37.1	25	18.5
Alternating current circuit analysis	28	20.9	36	26.6	45	33.3	26	19.2
Familiarization with and practical application of modern electronic test equipment	22	16.4	30	22.2	53	39.2	30	22.2
Theory and application of semi-conductor devices	21	15.7	21	15.5	41	30.3	52	38.5
Television theory and service procedure	2	1.6	13	9.6	42	31.0	78	57.8
Electric motor theory and controls	20	14.8	18	13.4	61	45.2	36	26.6
Theory and application of computer circuitry	10	7.4	20	14.8	47	34.8	58	43.0
Metals area								
Basic metal casting procedures	22	16.6	28	20.6	47	34.8	38	28.0
Heat treating principles and techniques	30	22.4	26	19.2	44	32.5	35	25.9
Use of metalworking tools	36	26.7	33	24.5	35	25.9	31	22.9
Fundamental metal machine operations	37	27.6	38	28.0	32	23.8	28	20.6
Relationship between structure and properties of metals	36	26.8	33	24.5	37	27.3	29	21.4

Table 156 (Continued)

Course	Essential N	Essential %	Important N	Important %	Desirable N	Desirable %	No Value N	No Value %
Metals area (Continued)								
Principles and practices of sheet metal fabrication	29	21.4	29	21.4	43	32.0	34	25.2
Welding ferrous and non-ferrous metals	32	23.8	30	22.2	47	32.8	26	19.2
Fundamentals of metal spinning	6	4.6	7	5.1	40	29.6	82	60.7
Power mechanics area								
Sources, development, and application of power	24	17.9	30	22.2	50	37.0	31	22.9
The automobile industry	15	11.1	16	11.9	41	30.3	63	46.7
Operating principles of automobile components	15	11.1	19	14.1	47	34.8	54	40.0
Service of automobile components	14	10.5	15	11.1	46	34.0	60	44.4
Principles and applications of fluids (hydraulics)	27	20.1	34	25.2	39	28.8	35	25.9
Graphic arts area								
Fundamentals of design, finishing, and reproduction of printed materials	15	11.1	18	13.3	51	37.8	51	37.8
Techniques of quantity production of printed materials	14	10.4	12	8.9	53	39.2	56	41.5
Plastics area								
Chemical and physical properties of plastic resins	17	12.7	26	19.2	49	36.3	43	31.8
Plastics processing methods	18	13.5	22	16.2	51	37.8	44	32.5
General area								
Industrial education--its place in society	13	9.6	22	16.4	48	35.5	52	38.5
Planning and layout of industrial shops, laboratories, and classroom facilities	16	12.0	34	25.2	48	35.5	37	27.3
Initiating and maintaining effective safety programs	48	35.7	44	32.5	29	21.4	14	10.4

Industry occupational groups

'Industrial engineering', 'Sales and distribution', and 'Personnel and/or training administration' were the three industry occupational groups which were checked by ten or more respondents.

Industrial engineering Industrial engineers indicated that fundamentals of algebra and trigonometry were two content areas of value to them. The 'Essential' and 'Important' categories were checked by 80.0 percent and 87.0 percent of those who replied. Additional data in Table 157 discloses that organic chemistry, inorganic chemistry, and calculus were rated 'Desirable' or 'No value' by, respectively, 90.0 percent, 74.0 percent, and 76.0 percent.

One content area, as reported in Table 158, had a high percentage of replies in the 'No value' category. Application of human learning principles to classroom situations was apparently important to very few industrial engineers.

Data in Tables 159 and 160 seem to indicate that, in the opinion of these respondents, there was very little need for content in the biological sciences and humanities.

The communicative arts, as revealed in Table 161, were not marked 'No value' by any respondents who indicated that industrial engineering was their occupational group.

As is apparent by the data presented in Table 162, all drafting content with the exception of architectural conventions and techniques was rated 'Essential' by the major percentage of the group. Finishing, several metals areas, and two of the power mechanics content areas shared this distinction. Initiating and maintaining effective safety programs, though rated 'Essential' by only 30.0 percent, was rated 'Important' by 50.0 percent.

Table 157. Evaluation of physical science and mathematics course content--by industry occupational group, industrial engineering N = 38

Course	Essential N	Essential %	Important N	Important %	Desirable N	Desirable %	No Value N	No Value %
Organic chemistry	-		4	10	17	44	18	46
Inorganic chemistry	1	3	9	23	18	46	11	28
Fundamentals of algebra	23	59	11	28	5	13	-	
Fundamentals of trigonometry	21	54	10	26	8	20	-	
Analytic geometry	13	33	14	36	9	23	3	8
Objectives and procedures of cost accounting	10	26	13	33	13	33	3	8
Calculus	2	6	7	17	20	51	10	26
Principles of statistics	5	13	9	23	21	54	4	10
Application of statistics	5	13	10	26	20	51	4	10
Computer organization	3	8	13	33	15	39	8	20
Computer programing	3	8	9	23	16	41	11	28
Concepts and principles of physics	15	39	13	33	9	22	2	6

Table 158. Evaluation of social science course content--by industry occupational group, industrial engineering N = 38

Course	Essential N	Essential %	Important N	Important %	Desirable N	Desirable %	No Value N	No Value %
Economic principles, problems and policies	-		19	49	17	44	3	7
Structure and organization of trade unions	9	23	13	33	12	31	5	13
Problems, policies and procedures in contemporary labor relations	7	14	15	39	14	36	3	8
Governmental functions and processes	4	10	11	28	19	49	5	13
Fundamental psychological concepts	4	10	15	39	16	41	4	10
Principles of motivation and learning	5	13	18	46	12	33	4	8
Psychological development of the individual	3	8	9	23	21	54	6	15
Application of human learning principles to classroom situations	-		3	8	14	36	22	56
Analysis of group, community, and cultural relations	-		8	20	23	60	8	20

Table 159. Evaluation of biological science course content--by industry occupational group, industrial engineering N = 38

Course	Essential N	Essential %	Important N	Important %	Desirable N	Desirable %	No Value N	No Value %
Organization and function of living systems	1	3	1	3	9	23	28	71
Physiology and anatomy of humans	1	3	1	3	11	28	26	66

Table 160. Evaluation of humanities course content--by industry occupational group, industrial engineering N = 38

Course	Essential N	Essential %	Important N	Important %	Desirable N	Desirable %	No Value N	No Value %
Social and cultural development of western civilization	-		2	6	10	24	27	70
Political, economic and social development of the United States	1	3	5	12	17	44	16	41

Table 161. Evaluation of communicative arts course content--by industry occupational group, industrial engineering N = 38

Course	Essential N	Essential %	Important N	Important %	Desirable N	Desirable %	No Value N	No Value %
Writing as a means to communicate ideas, judgements, observations, and other information	24	62	13	32	2	6	-	
Reading and observations as a source of information	25	64	9	23	5	13	-	
Principles of oral communications	23	58	14	36	2	6	-	
Group communication problems and practices	20	51	14	36	5	13	-	

Table 162. Evaluation of industrial education course content--by industry occupational group, industrial engineering N = 38

Course	Essential N	Essential %	Important N	Important %	Desirable N	Desirable %	No Value N	No Value %
Wood area								
Wood fabricating techniques	3	8	7	17	14	36	15	39
Principles of building construction	5	13	8	20	17	44	9	23
Chemical and physical properties of wood	3	8	5	13	12	30	19	49
Processing of wood products	4	10	-		17	44	18	46
Drafting area								
Principle elements of mechanical drafting	24	62	10	26	5	12	-	
Fundamentals of freehand drafting	21	54	9	23	8	20	1	3
Architectural drafting conventions and techniques	8	20	4	10	20	52	7	18
Spatial geometry (descriptive)	13	33	12	30	10	27	4	10
Design principles	18	46	9	23	11	28	1	3
Finishing area								
Materials, products, processing of finishing	16	42	9	24	7	17	7	17
Electricity-electronics area								
Direct current circuit analysis	7	17	11	28	15	39	6	16
Alternating current circuit analysis	10	26	11	28	12	30	6	16
Familiarization with and practical application of modern electronic test equipment	6	16	10	25	17	43	6	16
Theory and application of semi-conductor devices	5	14	8	20	13	33	13	33
Television theory and service procedure	-		3	8	11	27	25	65
Electric motor theory and controls	9	29	7	18	17	44	6	14
Theory and application of computer circuitry	2	6	6	15	12	30	19	49

Table 162 (Continued)

Course	Essential N	Essential %	Important N	Important %	Desirable N	Desirable %	No Value N	No Value %
Metals area								
Basic metal casting procedures	11	28	11	28	13	33	4	11
Heat treating principles and techniques	15	39	8	20	11	28	5	13
Use of metalworking tools	21	54	6	14	8	22	4	10
Fundamental metal machine operations	22	56	11	28	3	8	3	8
Relationship between structure and properties of metals	19	49	10	25	5	13	5	13
Principles and practices of sheet metal fabrication	18	46	7	18	9	23	5	13
Welding ferrous and non-ferrous metals	20	51	7	18	7	18	5	13
Fundamentals of metal spinning	2	6	3	8	14	35	20	51
Power mechanics area								
Sources, development, and application of power	14	35	9	23	9	23	7	19
The automobile industry	5	13	8	20	11	28	15	39
Operating principles of automobile components	5	13	8	20	9	23	17	44
Service of automobile components	5	13	6	15	11	28	17	44
Principles and applications of fluids (hydraulics)	12	30	12	30	10	26	5	14
Graphic arts area								
Fundamentals of design, finishing, and reproduction of printed materials	5	14	6	16	12	33	13	37
Techniques of quantity production of printed materials	6	16	3	9	14	39	13	36
Plastics area								
Chemical and physical properties of plastic resins	3	9	7	19	14	39	12	33
Plastics processing methods	3	9	7	19	14	39	12	33

Table 162 (Continued)

Course	Essential N	Essential %	Important N	Important %	Desirable N	Desirable %	No Value N	No Value %
General area								
Industrial education--its place in society	4	11	5	14	13	36	14	39
Planning and layout of industrial shops, laboratories, and classroom facilities	1	3	11	31	17	47	7	19
Initiating and maintaining effective safety programs	11	31	18	50	5	13	2	6

Sales and distribution There were four content areas rated on the 'Needed' side of the rating scale by more than 60.0 percent of the respondents. These and their percentages, as can be seen in Table 163, were fundamentals of algebra, 70.0 percent; objectives and procedures of cost accounting, 79.0 percent; and application of statistics, 66.0 percent.

Examination of Table 164 discloses no major percentages of replies within the social science area in the 'Essential' category, although there were two areas which were rated 'Important' or 'Essential' by more than 70.0 percent. These areas were economic principles, problems, and policies, and principles of motivation and learning.

Examination of the biological sciences and humanities data contained in Tables 165 and 166 reveals that the major percentages of replies were in the 'No value' and 'Desirable' categories for these areas.

Only one respondent of the sales and distribution group marked the 'Not needed' side of the rating scale for the communicative arts content. All

other replies were on the 'Needed' side, with the majority reporting that this content was 'Essential' for their occupational positions. Complete percentages and frequency lists can be found in Table 167.

The evaluation of the industrial education content is represented by the data found in Table 168.

For the graduates employed in the sales and distribution group, there was evidently very little 'Essential' content in the technical courses of the curriculum. The majority of the high percentages are in the 'No value' category.

Table 163. Evaluation of physical science and mathematics course content--by industry occupational group, sales and distribution N = 24

Course	Essential N	Essential %	Important N	Important %	Desirable N	Desirable %	No Value N	No Value %
Organic chemistry	2	8	3	12	9	38	10	42
Inorganic chemistry	3	12	4	16	10	42	7	30
Fundamentals of algebra	9	38	8	32	?	30	-	
Fundamentals of trigonometry	7	30	5	21	10	42	2	7
Analytic geometry	6	25	3	13	11	46	4	16
Objectives and procedures of cost accounting	6	25	13	54	4	17	1	4
Calculus	3	12	2	8	10	42	9	38
Principles of statistics	4	16	14	60	2	8	4	16
Application of statistics	4	16	12	50	3	13	5	21
Computer organization	6	25	5	21	8	33	5	21
Computer programing	4	16	5	21	8	33	7	30
Concepts and principles of physics	5	20	7	30	12	50	-	

Table 164. Evaluation of social science course content--by industry occupational group, sales and distribution N = 24

Course	Essential N	Essential %	Important N	Important %	Desirable N	Desirable %	No Value N	No Value %
Economic principles, problems and policies	7	30	10	42	6	25	1	3
Structure and organization of trade unions	2	9	7	30	14	58	1	3
Problems, policies and procedures in contemporary labor relations	3	12	7	30	12	50	2	8
Governmental functions and processes	3	12	3	12	16	67	2	9
Fundamental psychological concepts	5	21	9	38	9	38	1	3
Principles of motivation and learning	7	30	10	42	6	25	1	3
Psychological development of the individual	3	12	10	42	9	38	2	8
Application of human learning principles to classroom situations	2	8	3	12	11	42	8	33
Analysis of group, community, and cultural relations	1	4	9	38	12	50	2	8

Table 165. Evaluation of biological science course content--by industry occupational group, sales and distribution N = 24

Course	Essential N	Essential %	Important N	Important %	Desirable N	Desirable %	No Value N	No Value %
Organization and function of living systems	-		3	12	8	34	13	54
Physiology and anatomy of humans	1	4	-		6	25	17	71

Table 166. Evaluation of humanities course content--by industry occupational group, sales and distribution N = 24

Course	Essential N	Essential %	Important N	Important %	Desirable N	Desirable %	No Value N	No Value %
Social and cultural development of western civilization	1	4	4	16	11	46	8	34
Political, economic and social development of the United States	1	4	6	25	14	58	3	13

Table 167. Evaluation of communicative arts course content--by industry occupational group, sales and distribution N = 24

Course	Essential N	Essential %	Important N	Important %	Desirable N	Desirable %	No Value N	No Value %
Writing as a means to communicate ideas, judgements, observations, and other information	22	92	2	8	-		-	
Reading and observations as a source of information	21	88	3	12	-		-	
Principles of oral communications	22	92	2	8	-		-	
Group communication problems and practices	16	66	7	30	1	4	-	

Table 168. Evaluation of industrial education course content--by industry occupational group, sales and distribution N = 24

Course	Essential N	Essential %	Important N	Important %	Desirable N	Desirable %	No Value N	No Value %
Wood area								
Wood fabricating techniques	1	4	1	4	11	46	11	46
Principles of building construction	3	12	2	8	9	38	10	42
Chemical and physical properties of wood	1	4	3	12	9	38	11	46
Processing of wood products	2	8	3	12	7	30	12	50

Table 168 (Continued)

Course	Essential N	Essential %	Important N	Important %	Desirable N	Desirable %	No Value N	No Value %
Drafting area								
Principle elements of mechanical drafting	2	8	9	38	8	34	5	20
Fundamentals of freehand drafting	7	30	7	30	6	25	4	15
Architectural drafting conventions and techniques	3	12	7	30	5	20	9	38
Spatial geometry (descriptive)	6	25	9	38	4	16	5	21
Design principles	7	30	9	38	5	21	3	11
Finishing area								
Materials, products, processing of finishing	4	16	5	21	5	21	10	42
Electricity-electronics area								
Direct current circuit analysis	6	25	7	29	6	25	5	21
Alternating current circuit analysis	6	25	7	29	5	21	6	25
Familiarization with and practical application of modern electronic test equipment	5	21	8	33	5	21	6	25
Theory and application of semi-conductor devices	5	21	3	13	6	25	10	41
Television theory and service procedure	1	4	3	13	3	13	17	70
Electric motor theory and controls	4	16	3	13	10	42	7	29
Theory and application of computer circuitry	3	13	5	21	5	21	11	45
Metals area								
Basic metal casting procedures	2	8	5	21	7	29	10	42
Heat treating principles and techniques	5	21	4	16	7	29	8	34
Use of metalworking tools	5	21	5	21	3	12	11	46
Fundamental metal machine operations	4	16	7	29	4	16	9	39
Relationship between structure and properties of metals	6	25	6	25	5	21	7	29

Table 168 (Continued)

Course	Essential N	Essential %	Important N	Important %	Desirable N	Desirable %	No Value N	No Value %
Principles and practices of sheet metal fabrication	2	8	7	29	4	16	11	47
Welding ferrous and non-ferrous metals	5	21	6	25	5	21	8	33
Fundamentals of metal spinning	1	4	1	4	6	25	16	67
Power mechanics area								
Sources, development, and application of power	4	16	2	9	12	50	6	25
The automobile industry	5	21	3	12	5	21	11	47
Operating principles of automobile components	3	12	5	21	5	21	11	46
Service of automobile components	3	12	3	12	5	21	13	55
Principles and applications of fluids (hydraulics)	6	25	3	12	6	25	9	38
Graphic arts area								
Fundamentals of design, finishing, and reproduction of printed materials	5	13	5	13	14	35	15	39
Techniques of quantity production of printed materials	3	8	5	13	15	39	16	40
Plastics area								
Chemical and physical properties of plastic resins	9	23	6	15	16	41	8	21
Plastics processing methods	10	26	5	13	17	44	7	17
General area								
Industrial education--its place in society	4	11	7	17	16	42	12	30
Planning and layout of industrial shops, laboratories, and classroom facilities	9	24	12	31	11	28	7	17
Initiating and maintaining effective safety programs	15	39	10	25	14	36	-	

Personnel and/or training administration The data in Tables 169 through 174, which represent opinions of the graduates who were classified in the personnel and/or training group, reveal that only fourteen content digests were rated 'Essential' or 'Important' by more than half of the respondents. Of these content areas, two were in physical science and mathematics, five were in social science, four were in communicative arts, and three were in industrial education. These content areas, their percentages, and the number of the table in which the information is found follow: fundamentals of algebra, 64.0 percent, Table 169; objectives and procedures of cost accounting, 55.0 percent, Table 169; economic principles and policies, 58.0 percent, Table 170; structure and organization of trade unions, 69.0 percent, Table 170; labor relations, 58.0 percent, Table 170; psychological concepts, 60.0 percent, Table 170; principles of motivation, 69.0 percent, Table 170; psychological development of the individual, 55.0 percent, Table 170; writing, 100.0 percent, Table 173; reading, 94.0 percent, Table 173; oral communication, 94.0 percent, Table 173; group communication, 84.0 percent, Table 173; fundamentals of freehand drafting, 61.0 percent, Table 174; design principles, 52.0 percent, Table 174; use of metalworking tools, 57.0 percent, Table 174; and initiating and maintaining effective safety programs, 57.0 percent, Table 174.

Industry areas of work

Of the nine industry areas of work which were included on the questionnaire, supervising, managing, training, sales, service, and materials analysis had frequencies of ten or more.

Table 169. Evaluation of physical science and mathematics course content--by industry occupational group, personnel and/or training administration N = 36

Course	Essential N	Essential %	Important N	Important %	Desirable N	Desirable %	No Value N	No Value %
Organic chemistry	1	3	3	9	13	36	19	52
Inorganic chemistry	1	3	2	6	17	47	16	44
Fundamentals of algebra	9	25	14	39	10	27	3	9
Fundamentals of trigonometry	6	16	11	31	15	42	4	11
Analytic geometry	4	11	7	19	15	42	10	28
Objectives and procedures of cost accounting	5	13	15	42	15	42	1	3
Calculus	2	5	3	9	16	44	15	42
Principles of statistics	6	16	8	22	16	46	6	16
Application of statistics	5	15	9	25	16	44	6	16
Computer organization	4	11	9	25	18	50	5	14
Computer programing	3	9	7	19	19	53	7	19
Concepts and principles of physics	4	11	14	39	15	41	3	9

Table 170. Evaluation of social science course content--by industry occupational group, personnel and/or administration N = 36

Course	Essential N	Essential %	Important N	Important %	Desirable N	Desirable %	No Value N	No Value %
Economic principles, problems and policies	5	14	16	44	13	36	2	6
Structure and organization of trade unions	8	22	17	47	8	22	3	9
Problems, policies and procedures in contemporary labor relations	6	16	15	42	13	36	2	6
Governmental functions and processes	2	6	15	41	17	47	2	6
Fundamental psychological concepts	11	32	10	28	12	33	3	9
Principles of motivation and learning	17	47	8	22	11	31	-	
Psychological development of the individual	8	22	12	33	13	36	3	9
Application of human learning principles to classroom situations	8	22	7	19	14	40	7	19
Analysis of group, community, and cultural relations	5	14	8	22	18	50	5	14

Table 171. Evaluation of biological science course content--by industry occupational group, personnel and/or training administration N = 36

Course	Essential N	Essential %	Important N	Important %	Desirable N	Desirable %	No Value N	No Value %
Organization and function of living systems	-		3	9	15	41	18	50
Physiology and anatomy of humans	-		5	14	15	42	16	44

Table 172. Evaluation of humanities course content--by industry occupational group, personnel and/or training administration N = 36

Course	Essential N	Essential %	Important N	Important %	Desirable N	Desirable %	No Value N	No Value %
Social and cultural development of western civilization	-		2	6	19	53	15	41
Political, economic and social development of the United States	-		7	19	23	65	6	16

Table 173. Evaluation of communicative arts course content--by industry occupational group, personnel and/or administration N = 36

Course	Essential N	Essential %	Important N	Important %	Desirable N	Desirable %	No Value N	No Value %
Writing as a means to communicate ideas, judgements, observations, and other information	28	78	8	22	-		-	
Reading and observations as a source of information	24	66	10	28	2	6	-	
Principles of oral communications	24	66	10	28	2	6	-	
Group communication problems and practices	22	62	8	22	6	16	-	

Table 174. Evaluation of industrial education course content--by industry occupational group, personnel and/or administration N = 36

Course	Essential N	Essential %	Important N	Important %	Desirable N	Desirable %	No Value N	No Value %
Wood area								
Wood fabricating techniques	2	6	1	3	20	55	13	36
Principles of building construction	3	9	4	11	18	50	11	30
Chemical and physical properties of wood	2	6	-		16	44	18	50
Processing of wood products	2	6	-		17	47	17	47
Drafting area								
Principle elements of mechanical drafting	1	3	11	31	15	42	9	24
Fundamentals of freehand drafting	4	11	18	50	11	31	3	8
Architectural drafting conventions and techniques	3	9	8	22	18	50	7	19
Spatial geometry (descriptive)	6	16	7	19	19	54	4	11
Design principles	7	19	12	33	14	39	3	9
Finishing area								
Materials, products, processing of finishing	3	9	12	33	11	31	10	27
Electricity-electronics area								
Direct current circuit analysis	7	19	10	28	13	36	6	17
Alternating current circuit analysis	7	19	8	22	15	42	6	17
Familiarization with and practical application of modern electronic test equipment	7	19	4	11	19	54	6	16
Theory and application of semi-conductor devices	7	19	5	15	12	33	12	33
Television theory and service procedure	-		5	15	15	42	16	43
Electric motor theory and controls	5	15	4	11	18	50	9	24
Theory and application of computer circuitry	3	9	6	16	17	47	10	28

Table 174 (Continued)

Course	Essential N	Essential %	Important N	Important %	Desirable N	Desirable %	No Value N	No Value %
Metals area								
Basic metal casting procedures	6	16	7	19	13	36	10	29
Heat treating principles and techniques	6	16	9	25	12	33	9	26
Use of metalworking tools	5	15	15	42	10	27	6	16
Fundamental metal machine operations	8	22	10	28	15	42	3	8
Relationship between structure and properties of metals	7	19	9	25	15	41	5	15
Principles and practices of sheet metal fabrication	5	15	9	25	14	39	8	21
Welding ferrous and non-ferrous metals	3	9	13	36	17	47	3	8
Fundamentals of metal spinning	1	3	2	6	10	26	23	65
Power mechanics area								
Sources, development, and application of power	2	6	10	27	17	47	7	20
The automobile industry	3	9	3	9	10	28	20	54
Operating principles of automobile components	3	9	3	9	15	41	15	41
Service of automobile components	3	9	3	9	11	31	19	51
Principles and applications of fluids (hydraulics)	4	11	11	31	13	36	8	22
Graphic arts area								
Fundamentals of design, finishing, and reproduction of printed materials	3	13	5	21	8	33	8	33
Techniques of quantity production of printed materials	3	12	3	12	9	38	9	38
Plastics area								
Chemical and physical properties of plastic resins	3	12	5	21	5	21	11	46
Plastics processing methods	3	12	4	17	5	21	12	50

Table 174 (Continued)

Course	Essential N	Essential %	Important N	Important %	Desirable N	Desirable %	No Value N	No Value %
General area								
Industrial education--its place in society	4	16	4	16	7	30	9	38
Planning and layout of industrial shops, laboratories, and classroom facilities	3	13	4	16	6	25	11	46
Initiating and maintaining effective safety programs	7	29	9	38	2	8	6	25

Supervising Algebra was the only content area of the physical science and mathematics areas in which the largest percentage of replies were in the 'Essential' category. All other content high frequencies were on the 'Not needed' side of the scale. Specific frequencies can be seen in Table 175.

Social science course content data indicate that five areas were rated either 'Essential' or 'Important' by more than half of the respondents of this area of work. These areas and their percentages were economic principles, 53.0 percent; structure and organization of trade unions, 66.0 percent; labor relations, 72.0 percent; psychological concepts, 66.0 percent; and principles of motivation and learning, 69.0 percent. These data are found in Table 176.

Contained in Tables 177 and 178 are data which suggest that, in the opinions of the majority of respondents, biological science and humanities content were not needed in the performance of the duties associated with supervision.

Information contained in Table 179 discloses that the communicative arts course content was rated on the 'Needed' side by from 87.0 to 97.0 percent of the graduates. In all four content areas listed, at least 59.0 percent rated them 'Essential'.

Table 180 contains the data which refer to all of the industrial education core content. As can be seen, only four of the content areas were rated 'Essential' by the largest percentage of respondents. Those apparently considered 'Essential' were the areas of safety, metallurgy, metal machining, and mechanical drawing.

Table 175. Evaluation of physical science and mathematics course content--by industry area of work, supervising N = 32

Course	Essential N	Essential %	Important N	Important %	Desirable N	Desirable %	No Value N	No Value %
Organic chemistry	1	3	3	9	13	41	15	47
Inorganic chemistry	2	6	4	12	15	47	11	35
Fundamentals of algebra	12	38	9	28	10	33	1	3
Fundamentals of trigonometry	9	28	7	22	13	41	3	9
Analytic geometry	5	16	7	22	12	37	8	25
Objectives and procedures of cost accounting	5	16	14	43	13	41	-	
Calculus	1	3	7	22	14	43	10	32
Principles of statistics	2	6	12	37	16	51	2	6
Application of statistics	2	6	13	41	15	47	2	6
Computer organization	2	6	10	31	15	47	5	16
Computer programing	1	3	6	19	17	53	8	25
Concepts and principles of physics	7	22	11	35	12	37	2	6

Managing The frequencies of the replies of those who classified themselves in the managing area of work are contained in Tables 181 through 186. Only two content areas in the general education content evaluations

Table 176. Evaluation of social science course content--by industry area of work, supervising N = 32

Course	Essential N	Essential %	Important N	Important %	Desirable N	Desirable %	No Value N	No Value %
Economic principles, problems and policies	3	9	14	44	14	44	1	3
Structure and organization of trade unions	7	22	14	44	10	31	1	3
Problems, policies and procedures in contemporary labor relations	10	31	13	41	7	22	2	6
Governmental functions and processes	3	9	12	37	13	41	4	13
Fundamental psychological concepts	9	28	12	38	9	28	2	6
Principles of motivation and learning	12	38	10	31	10	31	-	
Psychological development of the individual	5	16	8	25	16	50	3	9
Application of human learning principles to classroom situations	3	9	6	19	16	50	7	22
Analysis of group, community, and cultural relations	3	9	11	34	13	41	5	16

Table 177. Evaluation of biological science course content--by industry area of work, supervising N = 32

Course	Essential N	Essential %	Important N	Important %	Desirable N	Desirable %	No Value N	No Value %
Organization and function of living systems	-		4	13	13	40	15	47
Physiology and anatomy of humans	2	6	4	13	12	38	14	43

Table 178. Evaluation of humanities course content--by industry area of work, supervising N = 32

Course	Essential N	Essential %	Important N	Important %	Desirable N	Desirable %	No Value N	No Value %
Social and cultural development of western civilization	-		4	13	12	37	16	50
Political, economic and social development of the United States	1	3	8	25	16	50	7	22

Table 179. Evaluation of communicative arts course content--by industry area of work, supervising N = 32

Course	Essential N	Essential %	Important N	Important %	Desirable N	Desirable %	No Value N	No Value %
Writing as a means to communicate ideas, judgements, observations, and other information	19	59	12	38	1	3	-	
Reading and observations as a source of information	15	47	14	44	3	9	-	
Principles of oral communications	21	66	9	28	2	6	-	
Group communication problems and practices	20	62	8	25	4	13	-	

Table 180. Evaluation of industrial education course content--by industry area of work, supervising N = 32

Course	Essential N	Essential %	Important N	Important %	Desirable N	Desirable %	No Value N	No Value %
Wood area								
Wood fabricating techniques	1	3	2	6	18	52	11	34
Principles of building construction	4	13	3	9	18	57	7	22
Chemical and physical properties of wood	1	3	-		16	50	15	47
Processing of wood products	1	3	1	3	16	50	14	44

Table 180 (Continued)

Course	Essential N	Essential %	Important N	Important %	Desirable N	Desirable %	No Value N	No Value %
Drafting area								
Principle elements of mechanical drafting	12	38	11	34	9	28	-	
Fundamentals of freehand drafting	5	15	13	41	13	41	1	3
Architectural drafting conventions and techniques	1	3	7	22	20	62	4	13
Spatial geometry (descriptive)	8	25	6	18	13	41	5	16
Design principles	7	22	9	28	15	47	1	3
Finishing area								
Materials, products, processing of finishing	3	9	8	25	11	34	10	32
Electricity-electronics area								
Direct current circuit analysis	4	13	9	28	11	34	8	25
Alternating current circuit analysis	4	13	10	31	10	31	8	25
Familiarization with and practical application of modern electronic test equipment	4	13	4	13	14	43	10	31
Theory and application of semi-conductor devices	3	9	7	22	7	22	15	47
Television theory and service procedure	-		5	16	11	34	16	50
Electric motor theory and controls	4	12	5	16	15	47	8	25
Theory and application of computer circuitry	3	9	6	19	12	38	11	34
Metals area								
Basic metal casting procedures	6	19	6	19	13	40	7	22
Heat treating principles and techniques	8	25	8	25	10	31	6	19
Use of metalworking tools	8	25	10	31	8	25	6	19
Fundamental metal machine operations	11	34	9	28	8	25	4	13
Relationship between structure and properties of metals	11	34	6	19	10	31	5	16

Table 180 (Continued)

Course	Essential N	Essential %	Important N	Important %	Desirable N	Desirable %	No Value N	No Value %
Metals area (Continued)								
Principles and practices of sheet metal fabrication	8	25	8	25	10	31	6	19
Welding ferrous and non-ferrous metals	6	19	6	19	17	53	3	9
Fundamentals of metal spinning	1	3	2	6	7	22	22	69
Power mechanics area								
Sources, development, and application of power	1	3	10	31	17	55	4	12
The automobile industry	-		4	12	14	44	14	44
Operating principles of automobile components	1	3	4	12	14	44	13	41
Service of automobile components	-		5	15	14	44	13	41
Principles and applications of fluids (hydraulics)	4	12	12	37	9	28	7	23
Graphic arts area								
Fundamentals of design, finishing, and reproduction of printed materials	1	3	2	6	14	44	15	47
Techniques of quantity production of printed materials	2	6	1	3	14	44	15	47
Plastics area								
Chemical and physical properties of plastic resins	4	12	6	19	13	41	9	28
Plastics processing methods	4	12	6	19	14	44	8	25
General area								
Industrial education--its place in society	3	9	5	17	12	37	12	37
Planning and layout of industrial shops, laboratories, and classroom facilities	2	6	9	28	11	35	10	31
Initiating and maintaining effective safety programs	16	50	11	35	3	9	2	6

were rated 'No value' by more than 50.0 percent. Those were organization and function of living systems and physiology and anatomy of humans with 55.0 percent and 64.0 percent respectively. Algebra and the four areas of the communicative arts each had the greatest percentage of replies in the 'Essential' category.

Table 186 is the summary of the industrial education content evaluations. There were two content areas in which the 'Essential' ratings had the greatest number of replies. Mechanical drafting and safety had, respectively, 44.0 percent and 40.0 percent. Most other content was rated in a manner which suggested that it was not needed by graduates in the area of managing.

Table 181. Evaluation of physical science and mathematics course content--by industry area of work, managing N = 22

Course	Essential N	Essential %	Important N	Important %	Desirable N	Desirable %	No Value N	No Value %
Organic chemistry	-		5	23	6	27	11	50
Inorganic chemistry	-		4	19	11	50	7	31
Fundamentals of algebra	7	31	8	37	6	27	1	5
Fundamentals of trigonometry	7	31	7	31	6	29	2	9
Analytic geometry	4	19	10	43	4	19	4	19
Objectives and procedures of cost accounting	4	19	11	59	7	31	-	
Calculus	2	9	1	5	11	50	8	36
Principles of statistics	4	19	7	31	7	31	4	19
Application of statistics	3	14	8	36	7	31	4	19
Computer organization	3	13	3	13	6	27	10	47
Computer programing	3	13	2	9	7	31	10	47
Concepts and principles of physics	4	17	8	36	10	47	-	

Table 182. Evaluation of social science course content--by industry area of work, managing N = 22

Course	Essential N	Essential %	Important N	Important %	Desirable N	Desirable %	No Value N	No Value %
Economic principles, problems and policies	1	5	12	55	9	40	-	
Structure and organization of trade unions	4	19	7	31	7	31	4	19
Problems, policies and procedures in contemporary labor relations	1	5	10	46	9	40	2	9
Governmental functions and processes	1	5	12	55	9	40	-	
Fundamental psychological concepts	3	13	9	40	7	34	3	13
Principles of motivation and learning	6	29	9	37	6	29	1	5
Psychological development of the individual	3	13	6	27	12	55	1	5
Application of human learning principles to classroom situations	-		3	13	8	37	11	50
Analysis of group, community, and cultural relations	3	13	5	23	12	55	2	9

Table 183. Evaluation of biological science course content--by industry area of work, managing N = 22

Course	Essential N	Essential %	Important N	Important %	Desirable N	Desirable %	No Value N	No Value %
Organization and function of living systems	1	5	2	9	7	31	12	55
Physiology and anatomy of humans	1	5	2	9	5	22	14	64

Table 184. Evaluation of humanities course content--by industry area of work, managing N = 22

Course	Essential N	Essential %	Important N	Important %	Desirable N	Desirable %	No Value N	No Value %
Social and cultural development of western civilization	1	5	5	22	10	44	6	29
Political, economic and social development of the United States	2	9	7	32	11	50	2	9

Table 185. Evaluation of communicative arts course content--by industry area of work, managing N = 22

Course	Essential N	Essential %	Important N	Important %	Desirable N	Desirable %	No Value N	No Value %
Writing as a means to communicate ideas, judgements, observations, and other information	18	81	4	19	-		-	
Reading and observations as a source of information	15	69	5	22	2	9	-	
Principles of oral communications	18	82	3	13	1	5	-	
Group communication problems and practices	11	50	7	31	4	19	-	

Table 186. Evaluation of industrial education course content--by industry area of work, managing N = 22

Course	Essential N	Essential %	Important N	Important %	Desirable N	Desirable %	No Value N	No Value %
Wood area								
Wood fabricating techniques	4	18	-		6	27	12	55
Principles of building construction	5	22	1	5	9	41	7	32
Chemical and physical properties of wood	2	9	2	9	6	27	12	55
Processing of wood products	4	14	-		6	27	12	54

Table 186 (Continued)

Course	Essential N	Essential %	Important N	Important %	Desirable N	Desirable %	No Value N	No Value %
Drafting area								
Principle elements of mechanical drafting	10	44	4	19	7	32	1	5
Fundamentals of freehand drafting	7	32	3	13	8	36	4	19
Architectural drafting conventions and techniques	4	19	3	13	3	13	12	55
Spatial geometry (descriptive)	5	22	7	34	5	22	5	22
Design principles	5	22	6	29	8	36	3	13
Finishing area								
Materials, products, processing of finishing	5	22	3	13	8	36	6	29
Electricity-electronics area								
Direct current circuit analysis	3	14	7	31	9	46	2	9
Alternating current circuit analysis	5	23	8	37	7	31	2	9
Familiarization with and practical application of modern electronic test equipment	3	14	6	27	7	32	6	27
Theory and application of semi-conductor devices	4	19	5	23	6	27	7	31
Television theory and service procedure	-		1	5	8	37	13	58
Electric motor theory and controls	4	19	2	9	12	53	4	19
Theory and application of computer circuitry	-		3	14	8	37	11	49
Metals area								
Basic metal casting procedures	2	9	4	18	7	31	9	42
Heat treating principles and techniques	4	18	3	14	7	31	8	37
Use of metalworking tools	4	19	6	27	6	27	6	27
Fundamental metal machine operations	5	23	6	27	6	27	5	23
Relationship between structure and properties of metals	3	14	8	36	6	27	5	23

Table 186 (Continued)

Course	Essential N	Essential %	Important N	Important %	Desirable N	Desirable %	No Value N	No Value %
Metals area (Continued)								
Principles and practices of sheet metal fabrication	4	19	4	19	7	31	7	31
Welding ferrous and non-ferrous metals	4	19	5	23	8	35	5	23
Fundamentals of metal spinning	-		2	9	3	14	17	77
Power mechanics area								
Sources, development, and application of power	3	13	6	27	9	41	4	19
The automobile industry	3	13	1	5	4	19	14	63
Operating principles of automobile components	2	9	2	9	7	32	11	50
Service of automobile components	2	9	-		7	32	13	59
Principles and applications of fluids (hydraulics)	3	13	5	24	8	36	6	27
Graphic arts area								
Fundamentals of design, finishing, and reproduction of printed materials	3	12	1	5	8	36	10	47
Techniques of quantity production of printed materials	3	13	-		9	40	10	47
Plastics area								
Chemical and physical properties of plastic resins	2	9	4	17	6	27	10	47
Plastics processing methods	2	9	3	14	6	27	11	50
General area								
Industrial education--its place in society	1	5	1	5	8	35	12	55
Planning and layout of industrial shops, laboratories, and classroom facilities	3	13	4	19	7	32	8	36
Initiating and maintaining effective safety programs	9	40	5	24	6	27	2	9

Training Most respondents who revealed training to be their area of work marked application of human learning principles to classroom situations, writing, reading, oral and group communications 'Essential'. These and other data pertaining to general education course content can be seen in Tables 187 through 191.

Examination of the industrial education course content data found in Table 192 indicates that there was very little content considered 'Essential' by members of the training area of work.

Sales Algebra, trigonometry, cost accounting, principles of statistics, application of statistics, and computer organization are the content areas reported in Table 193 to have been 'Needed' by those employed in sales.

The data presented in Table 194 indicate that economics, psychological concepts, principles of motivation and learning, and psychological

Table 187. Evaluation of physical science and mathematics course content--by industry area of work, training N = 10

Course	Essential N	Essential %	Important N	Important %	Desirable N	Desirable %	No Value N	No Value %
Organic chemistry	-		-		1	10	9	90
Inorganic chemistry	-		-		6	60	4	40
Fundamentals of algebra	3	30	4	40	3	30	-	
Fundamentals of trigonometry	1	10	5	50	3	30	1	10
Analytic geometry	-		3	30	6	60	1	10
Objectives and procedures of cost accounting	1	10	5	50	3	30	1	10
Calculus	-		1	10	5	50	4	40
Principles of statistics	2	20	2	20	3	30	3	30
Application of statistics	2	20	1	10	4	40	3	30
Computer organization	3	30	2	20	4	40	1	10
Computer programing	2	20	3	30	3	30	2	20
Concepts and principles of physics	1	10	6	60	3	30	-	

Table 188. Evaluation of social science course content--by industry area of work, training N = 10

Course	Essential N	Essential %	Important N	Important %	Desirable N	Desirable %	No Value N	No Value %
Economic principles, problems and policies	1	10	5	50	1	10	3	30
Structure and organization of trade unions	1	10	4	40	-		5	50
Problems, policies and procedures in contemporary relations	2	20	1	10	4	40	3	30
Governmental functions and processes	2	20	2	20	5	50	1	10
Fundamental psychological concepts	3	30	3	30	3	30	1	10
Principles of motivation and learning	5	50	1	10	4	40	-	
Psychological development of the individual	4	40	1	10	3	30	2	20
Application of human learning principles to classroom situations	7	70	2	20	-		1	10
Analysis of group, community, and cultural relations	3	30	3	30	2	20	2	20

Table 189. Evaluation of biological science course content--by industry area of work, training N = 10

Course	Essential N	Essential %	Important N	Important %	Desirable N	Desirable %	No Value N	No Value %
Organization and function of living systems	-		2	20	3	30	5	50
Physiology and anatomy of humans	-		1	10	4	40	5	50

Table 190. Evaluation of humanities course content--by industry area of work, training N = 10

Course	Essential N	Essential %	Important N	Important %	Desirable N	Desirable %	No Value N	No Value %
Social and cultural development of western civilization	-		-		4	40	6	60
Political, economic and social development of the United States	-		-		7	70	3	30

Table 191. Evaluation of communicative arts course content--by industry area of work, training N = 10

Course	Essential N	Essential %	Important N	Important %	Desirable N	Desirable %	No Value N	No Value %
Writing as a means to communicate ideas, judgements observations, and other information	9	90	-		1	10	-	
Reading and observations as a source of information	8	80	1	10	1	10	-	
Principles of oral communications	8	80	-		2	20	-	
Group communication problems and practices	7	70	1	10	2	20	-	

Table 192. Evaluation of industrial education course content--by industry area of work, training N = 10

Course	Essential N	Essential %	Important N	Important %	Desirable N	Desirable %	No Value N	No Value %
Wood area								
Wood fabricating techniques	-		-		6	60	4	40
Principles of building construction	-		1	10	5	50	4	40
Chemical and physical properties of wood	-		-		4	40	6	60
Processing of wood products	-		-		4	40	6	60

Table 192 (Continued)

Course	Essential N	Essential %	Important N	Important %	Desirable N	Desirable %	No Value N	No Value %
Drafting area								
Principle elements of mechanical drafting	1	10	7	70	2	20	-	
Fundamentals of freehand drafting	1	10	6	60	2	20	1	10
Architectural drafting conventions and techniques	2	20	-		6	60	2	20
Spatial geometry (descriptive)	1	10	-		8	80	1	10
Design principles	2	20	4	40	3	30	1	10
Finishing area								
Materials, products, processing of finishing	2	20	4	40	3	30	1	10
Electricity-electronics area								
Direct current circuit analysis	3	30	4	40	2	20	1	10
Alternating current circuit analysis	3	30	3	30	3	30	1	10
Familiarization with and practical application of modern electronic test equipment	3	30	2	20	5	50	-	
Theory and application of semi-conductor devices	2	20	2	20	4	40	2	20
Television theory and service procedure	-		1	10	5	50	4	40
Electric motor theory and controls	2	20	1	10	6	60	1	10
Theory and application of computer circuitry	-		3	30	4	40	3	30
Metals area								
Basic metal casting procedures	1	10	2	20	4	40	3	30
Heat treating principles and techniques	1	10	2	20	4	40	3	30
Use of metalworking tools	-		2	20	5	50	3	30
Fundamental metal machine operations	1	10	1	10	5	50	3	30
Relationship between structure and properties of metals	-		2	20	5	50	3	30

Table 192 (Continued)

Course	Essential N	Essential %	Important N	Important %	Desirable N	Desirable %	No Value N	No Value %
Metals area (Continued)								
Principles and practices of sheet metal fabrication	-		1	10	4	40	5	50
Welding ferrous and non-ferrous metals	-		4	40	4	40	2	20
Fundamentals of metal spinning	-		-		4	40	6	60
Power mechanics area								
Sources, development, and application of power	2	20	2	20	3	30	3	30
The automobile industry	2	20	1	10	2	20	4	40
Operating principles of automobile components	3	30	1	10	1	10	4	40
Service of automobile components	4	40	1	10	1	10	4	40
Principles and applications of fluids (hydraulics)	3	30	2	20	3	30	2	20
Graphic arts area								
Fundamentals of design, finishing, and reproduction of printed materials	3	30	2	20	1	10	4	40
Techniques of quantity production of printed materials	3	30	1	10	1	10	5	50
Plastics area								
Chemical and physical properties of plastic resins	1	10	1	10	3	30	5	50
Plastics processing methods	1	10	1	10	3	30	5	50
General area								
Industrial education--its place in society	1	10	2	20	4	40	3	30
Planning and layout of industrial shops, laboratories, and classroom facilities	2	20	3	30	3	30	2	20
Initiating and maintaining effective safety programs	2	20	6	60	1	10	1	10

development of the individual were also 'Needed' by members of the sales area of work.

The communicative arts, as reported in Table 197, were obviously considered 'Essential' by the majority who replied.

Drafting appears to be the only area which was marked indicating that it was 'Needed' by sales personnel. Most other industrial education technical content was ranked 'Desirable' or 'No value'.

Service High frequencies occurred in the algebra and trigonometry content areas. It can be seen, however, that those two content areas and physics were rated 'Needed' by more than 60.0 percent of the respondents. The data in Table 199 also reveals that organic chemistry, inorganic chemistry, calculus, and computer organization were considered 'Not needed' by more than 60.0 percent of the graduates employed in the service area.

Table 193. Evaluation of physical science and mathematics course content--by industry area of work, sales N = 11

Course	Essential N	Essential %	Important N	Important %	Desirable N	Desirable %	No Value N	No Value %
Organic chemistry	1	9	2	18	5	45	3	28
Inorganic chemistry	2	18	2	18	5	46	2	18
Fundamentals of algebra	6	55	3	27	2	18	-	
Fundamentals of trigonometry	4	36	2	19	4	36	1	9
Analytic geometry	4	36	-		4	36	3	28
Objectives and procedures of cost accounting	4	36	6	55	1	9	-	
Calculus	1	9	1	9	4	36	5	46
Principles of statistics	-		9	82	1	9	1	9
Application of statistics	-		7	64	2	18	2	18
Computer organization	2	19	4	36	4	36	1	9
Computer programing	1	9	3	27	5	45	2	19
Concepts and principles of physics	3	27	1	9	7	64	-	

Table 194. Evaluation of social science course content--by industry area of work, sales N = 11

Course	Essential N	Essential %	Important N	Important %	Desirable N	Desirable %	No Value N	No Value %
Economic principles, problems and policies	4	36	5	46	2	18	-	
Structure and organization of trade unions	1	9	3	27	7	64	-	
Problems, policies and procedures in contemporary labor relations	2	18	2	18	6	55	1	9
Governmental functions and processes	1	9	2	18	8	73	-	
Fundamental psychological concepts	5	46	3	27	3	27	-	
Principles of motivation and learning	4	36	4	36	3	28	-	
Psychological development of the individual	2	18	5	46	4	36	-	
Application of human learning principles to classroom situations	1	9	-		6	54	4	37
Analysis of group, community, and cultural relations	1	9	3	27	7	64	-	

Table 195. Evaluation of biological science course content--by industry area of work, sales N = 11

Course	Essential N	Essential %	Important N	Important %	Desirable N	Desirable %	No Value N	No Value %
Organization and function of living systems	-		1	9	6	54	4	37
Physiology and anatomy of humans	1	9	-		3	27	7	64

Table 196. Evaluation of humanities course content--by industry area of work, sales N = 11

Course	Essential N	Essential %	Important N	Important %	Desirable N	Desirable %	No Value N	No Value %
Social and cultural development of western civilization	-		2	18	6	54	3	28
Political, economic and social development of the United States	-		2	18	8	73	1	9

Table 197. Evaluation of communicative arts course content--by industry area of work, sales N = 11

Course	Essential N	Essential %	Important N	Important %	Desirable N	Desirable %	No Value N	No Value %
Writing as a means to communicate ideas, judgements, observations, and other information	11	100	-		-		-	
Reading and observations as a source of information	10	91	1	9	-		-	
Principles of oral communications	10	91	1	9	-		-	
Group communication problems and practices	8	73	3	27	-		-	

Table 198. Evaluation of industrial education course content--by industry area of work, sales N = 11

Course	Essential N	Essential %	Important N	Important %	Desirable N	Desirable %	No Value N	No Value %
Wood area								
Wood fabricating techniques	-		-		7	63	4	37
Principles of building construction	1	9	1	9	6	55	3	27
Chemical and physical properties of wood	-		2	18	5	45	4	37
Processing of wood products	-		2	18	3	27	6	55

Table 198 (Continued)

Course	Essential N	Essential %	Important N	Important %	Desirable N	Desirable %	No Value N	No Value %
Drafting area								
Principle elements of mechanical drafting	5	45	3	27	1	9	2	19
Fundamentals of freehand drafting	5	45	3	27	1	9	2	19
Architectural drafting conventions and techniques	3	27	2	19	3	27	3	27
Spatial geometry (descriptive)	4	36	2	18	2	18	3	28
Design principles	5	45	1	9	2	18	3	28
Finishing area								
Materials, products, processing of finishing	2	18	2	18	3	27	4	37
Electricity-electronics area								
Direct current circuit analysis	3	27	2	19	3	27	3	27
Alternating current circuit analysis	3	27	2	19	3	27	3	27
Familiarization with and practical application of modern electronic test equipment	2	18	4	37	2	18	3	27
Theory and application of semi-conductor devices	2	18	2	18	2	18	5	46
Television theory and service procedure	-		-		2	18	9	82
Electric motor theory and controls	1	9	2	19	4	36	4	36
Theory and application of computer circuitry	1	9	3	27	3	27	4	37
Metals area								
Basic metal casting procedures	1	9	2	18	3	27	5	46
Heat treating principles and techniques	3	27	2	18	2	18	4	37
Use of metalworking tools	3	27	3	27	1	9	4	37
Fundamental metal machine operations	3	27	3	27	2	19	3	27
Relationship between structure and properties of metals	4	37	1	9	3	27	3	27

Table 198 (Continued)

Course	Essential N	Essential %	Important N	Important %	Desirable N	Desirable %	No Value N	No Value %
Metals area (Continued)								
Principles and practices of sheet metal fabrication	1	9	3	27	2	18	5	46
Welding ferrous and non-ferrous metals	3	27	1	9	2	18	5	46
Fundamentals of metal spinning	-		1	9	4	36	6	55
Power mechanics area								
Sources, development, and application of power	2	18	-		6	55	3	27
The automobile industry	3	27	1	9	3	27	4	37
Operating principles of automobile components	1	9	1	9	3	27	6	55
Service of automobile components	1	9	1	9	3	27	6	55
Principles and applications of fluids (hydraulics)	2	18	2	18	1	9	6	55
Graphic arts area								
Fundamentals of design, finishing, and reproduction of printed materials	2	18	2	18	3	27	4	37
Techniques of quantity production of printed materials	2	18	2	18	3	27	4	37
Plastics area								
Chemical and physical properties of plastic resins	3	27	2	18	2	18	4	37
Plastics processing methods	3	27	2	18	3	27	4	37
General area								
Industrial education--its place in society	3	27	3	27	4	37	1	9
Planning and layout of industrial shops, laboratories, and classroom facilities	2	18	2	18	3	27	4	37
Initiating and maintaining effective safety programs	4	36	2	19	1	9	4	36

The highest frequency of replies relating to the social science content did not occur in the 'Essential' category, although three areas were rated 'Essential' or 'Important' by more than 60.0 percent. These areas and their percentages were fundamental psychological concepts, 68.0 percent; principles of motivation and learning, 64.0 percent; and psychological development of the individual, 64.0 percent. Complete social science data for the service area of work can be seen in Table 200.

Tables 201 and 202 make it clear that biological science and humanities were rated on the 'Not needed' side of the scale.

Communicative arts was ranked high in importance by graduates employed in the service area. Percentages and frequencies of replies for this content area are included in Table 203.

Within the industrial education content area, as seen in Table 204, only mechanical drafting, spatial geometry, and initiating and maintaining safety

Table 199. Evaluation of physical science and mathematics course content--by industry area of work, service N = 17

Course	Essential N	Essential %	Important N	Important %	Desirable N	Desirable %	No Value N	No Value %
Organic chemistry	2	12	2	12	6	36	7	40
Inorganic chemistry	1	6	3	18	7	40	6	36
Fundamentals of algebra	8	46	4	24	4	24	1	6
Fundamentals of trigonometry	6	36	6	36	5	28	-	
Analytic geometry	5	28	4	24	6	36	2	12
Objectives and procedures of cost accounting	5	28	4	24	7	42	1	6
Calculus	1	6	3	18	5	28	8	48
Principles of statistics	4	24	4	24	5	28	4	24
Application of statistics	4	24	4	24	5	28	4	24
Computer organization	5	30	1	6	6	34	5	30
Computer programing	3	18	4	24	6	34	4	24
Concepts and principles of physics	3	18	8	46	4	24	2	12

programs were rated 'Important' or 'Essential' by more than 60.0 percent of the respondents.

Table 200. Evaluation of social science course content--by industry area of work, service N = 17

Course	Essential N	Essential %	Important N	Important %	Desirable N	Desirable %	No Value N	No Value %
Economic principles, problems and policies	1	6	8	47	8	47	-	
Structure and organization of trade unions	4	24	5	30	7	40	1	6
Problems, policies and procedures in contemporary labor relations	3	18	6	36	7	40	1	6
Governmental functions and processes	3	18	3	18	8	46	3	18
Fundamental psychological concepts	2	12	9	54	6	34	-	
Principles of motivation and learning	4	22	7	42	5	30	1	6
Psychological development of the individual	3	18	8	46	5	30	1	6
Application of human learning principles to classroom situations	2	12	3	18	5	30	7	40
Analysis of group, community, and cultural relations	1	6	6	36	9	52	1	6

Table 201. Evaluation of biological science course content--by industry area of work, service N = 17

Course	Essential N	Essential %	Important N	Important %	Desirable N	Desirable %	No Value N	No Value %
Organization and function of living systems	1	6	1	6	2	12	13	76
Physiology and anatomy of humans	1	6	-		6	36	10	58

Table 202. Evaluation of humanities course content--by industry area of work, service N = 17

Course	Essential N	Essential %	Important N	Important %	Desirable N	Desirable %	No Value N	No Value %
Social and cultural development of western civilization	-		1	6	7	42	9	52
Political, economic and social development of the United States	-		6	36	8	46	3	18

Table 203. Evaluation of communicative arts course content--by industry area of work, service N = 17

Course	Essential N	Essential %	Important N	Important %	Desirable N	Desirable %	No Value N	No Value %
Writing as a means to communicate ideas, judgements observations, and other information	13	76	4	24	-		-	
Reading and observations as a source of information	15	88	2	12	-		-	
Principles of oral communications	13	76	4	24	-		-	
Group communication problems and practices	14	72	1	6	1	6	1	6

Table 204. Evaluation of industrial education course content--by industry area of work, service N = 17

Course	Essential N	Essential %	Important N	Important %	Desirable N	Desirable %	No Value N	No Value %
Wood area								
Wood fabricating techniques	2	12	3	18	7	42	5	28
Principles of building construction	4	24	3	18	3	18	7	40
Chemical and physical properties of wood	2	12	2	12	4	24	9	52
Processing of wood products	2	12	1	6	6	36	8	46

Table 204 (Continued

Course	Essential N	Essential %	Important N	Important %	Desirable N	Desirable %	No Value N	No Value %
Drafting area								
Principle elements of mechanical drafting	7	40	5	30	5	30	-	
Fundamentals of freehand drafting	5	30	3	18	7	40	2	12
Architectural drafting conventions and techniques	4	22	5	30	3	18	5	30
Spatial geometry (descriptive)	6	36	5	30	2	12	4	22
Design principles	4	24	5	30	7	40	1	6
Finishing area								
Materials, products, processing of finishing	1	6	6	36	3	18	7	40
Electricity-electronics area								
Direct current circuit analysis	5	30	3	18	6	34	3	18
Alternating current circuit analysis	5	30	3	18	5	30	4	22
Familiarization with and practical application of modern electronic test equipment	4	24	3	18	7	42	3	18
Theory and application of semi-conductor devices	4	22	1	6	5	30	7	42
Television theory and service procedure	1	6	3	18	3	18	10	58
Electric motor theory and controls	3	18	3	18	5	30	6	34
Theory and application of computer circuitry	3	18	1	6	4	24	9	52
Metals area								
Basic metal casting procedures	3	18	4	24	4	24	6	34
Heat treating principles and techniques	5	30	1	6	6	34	5	30
Use of metalworking tools	5	30	3	18	3	18	6	34
Fundamental metal machine operations	3	18	7	42	2	12	5	28
Relationship between structure and properties of metals	4	24	5	28	4	24	4	24

Table 204 (Continued)

Course	Essential N	Essential %	Important N	Important %	Desirable N	Desirable %	No Value N	No Value %
Metals area (Continued)								
Principles and practices of sheet metal fabrication	3	18	5	30	2	12	7	40
Welding ferrous and non-ferrous metals	5	30	5	30	3	18	4	22
Fundamentals of metal spinning	2	12	1	6	4	24	10	58
Power mechanics								
Sources, development, and application of power	5	30	2	10	5	30	5	30
The automobile industry	3	18	3	18	4	24	7	40
Operating principles of automobile components	3	18	4	22	5	30	5	30
Service of automobile components	3	18	3	18	4	24	7	40
Principles and applications of fluids (hydraulics)	4	24	5	28	4	24	4	24
Graphic arts area								
Fundamentals of design, finishing, and reproduction of printed materials	-		5	28	6	36	6	36
Techniques of quantity production of printed materials	-		1	6	10	60	6	34
Plastics area								
Chemical and physical properties of plastic resins	3	18	5	30	3	18	6	34
Plastics processing methods	3	18	3	18	5	30	6	34
General area								
Industrial education--its place in society	2	12	2	12	7	42	6	34
Planning and layout of industrial shops, laboratories, and classroom facilities	2	12	6	36	6	36	3	16
Initiating and maintaining effective safety programs	8	46	6	36	3	18	-	

Materials analysis Evaluations of the general education course content areas are listed in Tables 205 through 209.

Fundamentals of algebra, fundamentals of trigonometry, and concepts and principles of physics all had large percentages of replies on the 'Needed' side of the rating scale. Percentages for those content areas were, respectively, 93.0, 86.0, and 73.0. These and other physical science data can be found in Table 205.

Communicative arts content areas, the evaluations of which can be seen in Table 209, also were apparently considered 'Needed'.

Graduates employed in the materials analysis area of work indicated a greater need for industrial education content than most other industry areas of work. Course content areas involving mechanical drafting, freehand drafting, design principles, finishing, metal casting, use of metalworking tools, metal machining, metallurgy, and welding were all ranked 'Essential' or

Table 205. Evaluation of physical science and mathematics course content--by industry area of work, materials analysis N = 15

Course	Essential N	Essential %	Important N	Important %	Desirable N	Desirable %	No Value N	No Value %
Organic chemistry	-		-		8	53	7	47
Inorganic chemistry	-		4	27	6	40	5	33
Fundamentals of algebra	9	60	5	33	1	7	-	
Fundamentals of trigonometry	8	53	5	33	1	7	1	7
Analytic geometry	5	33	4	27	4	27	2	13
Objectives and procedures of cost accounting	3	20	5	33	6	40	1	7
Calculus	1	7	3	19	7	47	4	27
Principles of statistics	3	20	3	20	7	47	2	13
Application of statistics	3	20	3	20	7	47	2	13
Computer organization	1	7	7	47	3	20	4	26
Computer programing	2	13	4	27	4	27	5	33
Concepts and principles of physics	6	40	5	33	4	27	-	

'Important' by more than 60.0 percent of the respondents. The industrial education course content data are listed in Table 210.

Table 206. Evaluation of social science course content--by industry area of work, materials analysis N = 15

Course	Essential N	Essential %	Important N	Important %	Desirable N	Desirable %	No Value N	No Value %
Economic principles, problems and policies	-		7	47	7	47	1	6
Structure and organization of trade unions	1	6	4	27	6	40	4	27
Problems, policies and procedures in contemporary labor relations	-		5	33	8	53	2	14
Governmental functions and processes	1	7	2	13	10	67	2	13
Fundamental psychological concepts	2	14	5	33	6	40	2	13
Principles of motivation and learning	1	7	5	33	4	27	5	33
Psychological development of the individual	1	7	3	20	5	33	6	40
Application of human learning principles to classroom situations	-		2	13	4	27	9	60
Analysis of group, community, and cultural relations	-		2	14	8	53	5	33

Table 207. Evaluation of biological science course content--by industry area of work, materials analysis N = 15

Course	Essential N	Essential %	Important N	Important %	Desirable N	Desirable %	No Value N	No Value %
Organization and function of living systems	-		-		2	13	13	87
Physiology and anatomy of humans	-		1	7	5	33	9	60

Table 208. Evaluation of humanities course content--by industry area of work, materials analysis N = 15

Course	Essential N	Essential %	Important N	Important %	Desirable N	Desirable %	No Value N	No Value %
Social and cultural development of western civilization	-		-		4	27	11	73
Political, economic and social development of the United States	-		1	7	5	33	9	60

Table 209. Evaluation of communicative arts course content--by industry area of work, materials analysis N = 15

Course	Essential N	Essential %	Important N	Important %	Desirable N	Desirable %	No Value N	No Value %
Writing as a means to communicate ideas, judgements observations, and other information	9	60	4	27	2	13	-	
Reading and observations as a source of information	10	67	2	13	3	20	-	
Principles of oral communications	6	40	8	53	1	7	-	
Group communication problems and practices	5	33	7	47	3	20	-	

Table 210. Evaluation of industrial education course content--by industry area of work, materials analysis N = 15

Course	Essential N	Essential %	Important N	Important %	Desirable N	Desirable %	No Value N	No Value %
Wood area								
Wood fabricating techniques	1	7	3	20	5	33	6	40
Principles of building construction	1	7	5	33	4	27	5	33
Chemical and physical properties of wood	2	13	2	13	2	13	9	60
Processing of wood products	2	13	-		6	40	7	47

Table 210 (Continued)

Course	Essential N	Essential %	Important N	Important %	Desirable N	Desirable %	No Value N	No Value %
Drafting area								
Principle elements of mechanical drafting	10	67	4	27	1	6	-	
Fundamentals of freehand drafting	7	47	5	33	3	20	-	
Architectural drafting conventions and techniques	1	7	1	7	10	66	3	20
Spatial geometry (descriptive)	4	27	3	20	7	47	1	6
Design principles	7	47	3	20	5	33	-	
Finishing area								
Materials, products, processing of finishing	9	60	4	26	1	7	1	7
Electricity-electronics area								
Direct current circuit analysis	2	13	5	33	7	47	1	7
Alternating current circuit analysis	3	20	5	33	6	40	1	7
Familiarization with and practical application of modern electronic test equipment	2	13	5	34	6	40	2	13
Theory and application of semi-conductor devices	2	13	2	13	5	34	6	40
Television theory and service procedure	-		2	13	1	7	12	80
Electric motor theory and controls	2	13	4	27	6	40	3	20
Theory and application of computer circuitry	1	6	3	20	1	7	10	67
Metals area								
Basic metal casting procedures	5	33	5	33	4	27	1	6
Heat treating principles and techniques	5	33	4	27	4	27	2	13
Use of metalworking tools	8	53	3	20	3	20	1	7
Fundamental metal machine operations	7	47	5	33	1	7	2	13
Relationship between structure and properties of metals	7	47	4	27	1	6	3	20

Table 210 (Continued)

Course	Essential N	Essential %	Important N	Important %	Desirable N	Desirable %	No Value N	No Value %
Metals area (Continued)								
Principles and practices of sheet metal fabrication	6	40	2	13	6	40	1	7
Welding ferrous and non-ferrous metals	7	47	4	27	2	13	2	13
Fundamentals of metal spinning	-		1	6	7	47	7	47
Power mechanics area								
Sources, development, and application of power	6	40	1	7	5	33	3	20
The automobile industry	2	13	2	13	5	34	6	40
The operating principles of automobile components	2	13	2	13	5	34	6	40
Service of automobile components	2	13	2	13	4	27	7	47
Principles and applications of fluids (hydraulics)	6	40	2	13	5	34	2	13
Graphic arts area								
Fundamentals of design, finishing, and reproduction of printed materials	2	13	3	20	4	27	6	40
Techniques of quantity production of printed materials	-		4	27	4	27	7	46
Plastics area								
Chemical and physical properties of plastic resins	3	20	1	7	9	60	2	13
Plastics processing methods	4	27	1	7	8	53	2	13
General area								
Industrial education--its place in society	2	13	4	27	5	33	4	27
Planning and layout of industrial shops, laboratories, and classroom facilities	4	27	3	20	6	40	2	13
Initiating and maintaining effective safety programs	1	7	6	40	7	46	1	7

DISCUSSION

A question frequently asked of the university-level industrial educator is "Just what do graduates of the curricula of industrial education do?" The findings of this study suggest the following status.

The graduate who is employed in education is a teacher. He is employed in an Iowa senior high school which has a student population between 500 and 2,500. He works full time as a teacher in either a singlefield industrial laboratory or an area unit industrial laboratory. His instructional responsibilities are limited to one or more of the following fields; general woodworking, general drafting, general electricity, general metals: or one of the following unit areas; drafting, electricity-electronics or auto mechanics. For this he receives an annual salary of about $10,000.

The graduate who is employed in industry is also located in Iowa. He is employed by a manufacturing firm which has a personnel complement of at least 1,000. His occupational group is industrial engineering or personnel and/or training administration. His area of work is supervising, managing, servicing, or analyzing materials or processes, for which he is paid slightly over $11,000 annually.

Although most of them are employed in Iowa, it is apparent that the Iowa State University industrial-education graduates in increasing numbers are finding employment in states other than Iowa. Udoh (23) reported that slightly more than 62.0 percent of the graduates were employed in Iowa in 1950. Wiltsie (27) reported 54.0 percent were employed in Iowa in 1956, and of those who contributed to this study, 52.0 percent report that they were employed within the boundaries of Iowa. Whether or not this could be

considered a trend is a moot point. Regardless, the researcher believes that the industrial-education instructional and administrative staff at Iowa State University should experience immense personal gratification when they become aware of the fact that their former students are contributing to a national effort, and are not limiting their contributions to Iowa.

Although it is difficult to ascertain, it is believed that among students who are investigating the two industrial-education curricula for the purpose of making a vocational selection, the additional salary of industry employment is a strong factor influencing the greater number to select industry. The data in Tables 2, 6, and 24 confirm that industry-employed graduates do have a higher median annual salary. However, the writer would feel amiss if he did not point out that this information can be interpreted another way as well. When a person is employed in industry, he is actively employed for at least eleven months. Although in certain industries some salaried employees are granted more than thirty days of vacation time, the industries with which the researcher is acquainted do not grant such liberties until after a ten- to fifteen-year employment period. The period of employment for education-employed persons is approximately nine and one-half months per year. By considering salary on a per-month basis, it can be seen that the median monthly salary for industry employed was $1,020, and for education employed it was $1,040.

Another question that confronts the industrial educator is, "Do the needs of the graduates differ?" In view of the variety of occupational classifications that exist among graduates, it seems logical to assume that the needs do vary. The investigation substantiated that logic. However, the investigation also disclosed the existence of many similar needs.

Agreement apparently exists that organic chemistry, inorganic chemistry, the biological sciences, and the humanities are of very little value in the performance of the tasks associated with the vocations of the graduates. The reverse is true with the communicative arts. These subject matter areas were apparently considered necessary by most of the respondents. With evidence of this nature available, it would seem that a likely course of action would be to reduce the number of required courses in biology, chemistry, etc., and increase the requirements in the communicative skills. The researcher is reluctant to suggest such a change. Although the findings may support such a decision, it is well to remember that opinions expressed were with respect to the occupational positions held by the respondents. In addition, it is difficult to imagine a life, including that part of life referred to as a vocation, completely void of the knowledge classified as biological and chemical science. Perhaps in the case of a supervisor of men in an industry there is no direct need for these content areas, but it would seem that understanding, consideration, and tolerance of the physical limits of animate and inanimate objects would be beneficial to both the supervisor and his men. Similarly, a knowledge of political science and history may not directly influence the actions of a teacher in the classroom, but to say that an understanding of political past and present is not needed by him is to suggest isolation.

If education is to be for life, these areas must remain as part of the industrial-education curricula. If, however, education is to be for vocational preparation only, possibly the content could be deleted from the curricula. It is the belief of the writer that the existence of general-education content in the industrial-education curricula verifies that there

has been a compromise between the advocates of education for life and the advocates of education for work. Within the industrial-education core content, it seems that there has been a similar compromise. The factions in this case are those who advocate concentration of study in one major instructional area and those who advocate generalized study in many instructional areas.

The findings of this investigation have made it clear that many of the industrial-education teachers are teaching in an area of specialization. Only 16 of the respondents indicated multifield-laboratory instruction. Since area-unit laboratory instruction and singlefield-laboratory instruction are a reality, providing for concentrated study at the university level in one area or one field would be a logical consideration.

The findings also establish that most industry-option graduates are employed in one of four areas of work, so it would seem logical to provide opportunity for industry-option students also to select an area of work and concentrate their scholastic efforts with specialization the goal.

It can be said with a high degree of confidence that the industry-option student who plans early in his university experience for a specific position in industry is the exception, not the rule. Now, with the frequencies and percentages reported in this study, he can be shown that, if he follows the pattern set by the graduates who preceded him, he will likely be employed in supervision, management, service, or research. He can then determine the requirements of these areas of work, evaluate them according to his preferences and aptitudes, and make a selection.

The education student, influenced by the need to practice teach, makes a stronger effort to prepare himself for a specific area of work by

concentrating on content within that area. For the potential teacher, then, the findings of this study may only confirm an already existing belief that a need for specialization exists.

After the initial examination of the content evaluation data, it was the researcher's opinion that the industry-option curriculum did not help greatly in preparing graduates for any industry vocation. However, after more consideration, that opinion changed. To enable one to realize the value of the curriculum for the industry-option major, the needs of those who are employed in the industry areas of work must be determined. In most cases, the graduate's major task is relating ideas, directions, and specific information to others. Consequently, there is a great need for communicative skills. The content evaluations in almost all cases acknowledge this. Also, the need for understanding the personnel with whom the industry graduate must communicate would seem to be important. The frequency of responses found in the social-science content tables corroborates that such a need exists. Psychological concepts and principles of motivation, as well as labor relations and labor union content, are all apparently thought to be valuable to the industry employed. The ability to perform basic mathematical operations and an understanding of principles of physics are obviously considered an important asset to a supervisor, manager, or researcher as well as to those in other work areas.

The content areas in the industrial-education core provide opportunity for practical application of these important concepts, practices, and skills in an atmosphere which is similar to that of industry itself. In the shops and laboratories, it is possible for communicative skills to be developed using the terms of each specific area of industry. It is possible for the

student to view, as well as to partake in, activities in which the application of principles of psychology and motivation is of major importance. Also, through their own experiences with production-type tools and equipment, they have the opportunity to develop empathy for the men with whom they may be meeting production quotas in the future. In each industrial-education technical-content area, application of principles of physics and mathematical operations make up a major portion of the content. As can be seen, it is the highly specialized content areas which are rated 'No value' by the industry respondents. The elemental content is apparently the more valuable.

For the industry-option student who plans for a specific area of work in a certain type of industry, the special content may be of value also.

The general-education courses of the industry-option curriculum of the industrial-education program at Iowa State University provide students with an opportunity to develop skills basic to many industry work areas. The core content provides opportunity to further develop these skills in an atmosphere similar to that of industry itself.

The student who plans for a specific area of work may concentrate on technical content peculiar to the area of his choice. The student without a specific plan can acquire a knowledge of many industrial concepts without concentrating his study in any one particular area.

The teaching-option curriculum appears to meet the needs of the education-employed graduate very well. Only one content area, calculus, was rated 'No value' by more than half of the respondents who classified themselves in the education-occupational classification. Further investigation revealed that there were some education-occupational groups and some areas

of work with reported frequencies that varied from those which can be seen in the data tabulated according to the education-occupational classification. For example, calculus was rated 'No value' by 76.0 percent of the junior high school occupational group. From the data presented in Table 67, it can be seen that 69.0 percent of the multifield-laboratory instructors who would be primarily at the junior high school level rated calculus 'No value'. Of the electricity-electronics area-unit instructors, as is revealed in Table 117, only 22.0 percent apparently considered calculus to be of 'No value'. Much of the content of a specialized nature was rated 'Essential' or 'Important' by area-unit instructors and singlefield instructors who were employed in those specialized fields or areas, but it was not rated so by all. An example of that can be seen in Tables 107 and 121. Theory and application of semi-conductor devices was rated 'Essential' by 22.0 percent of the singlefield wood instructors and the same content was rated 'Essential' by 89.0 percent of the electricity-electronics area-unit instructors. Other examples could also serve to point out that there are serious differences within the major classification, education--differences which substantiate that the need for specialization exists.

In addition to confirming the belief that such a need exists, the findings of the investigation can serve to help determine what subject matter would support or complement the various specialized areas. To illustrate such a purpose, the content evaluations for area-unit instruction--auto mechanics will be discussed.

The auto-mechanics teachers responded to the general-education content in a manner consistent with the other graduates in education. A need for fundamentals of algebra, trigonometry, and physics was expressed.

Psychological and learning concepts, plus communicative skills, were also considered important. Examination of the evaluation of the content areas within the industrial-education core reveals that mechanical drafting and freehand drafting were important to the auto-mechanics-area instructors. Finishing, which is directly related to auto mechanics, was apparently considered 'Needed'. The person who is familiar with auto-mechanics course content is aware of the relationship between electricity and the study of the automobile, since the engine fuel is ignited by electricity and many of the accessories are electrically operated. The idea that content within the electricity-electronics area is 'Needed' by the auto-mechanics teacher is verified by the responses in Table 135. Television and computer theory are the only content areas not rated 'Essential' or 'Important' by more than 80.0 percent of the auto-mechanics area-unit instructors.

None of the metals content was rated 'No value' by the auto-mechanics instructors. However, as could be expected, some content is considered to be more valuable than others. Use of metal-working tools and metal-machine operations were both rated 'Essential' by more than 70.0 percent. All other areas, with the exception of metal spinning, were rated 'Essential' or 'Important' by most of those persons employed in the auto-mechanics area.

The general industrial-education content also was considered by most to be necessary, as was the power-mechanics content.

According to the majority of opinions of the graduates who are employed in an area-unit laboratory and who are teaching auto mechanics, the following course content areas are needed, and, in the opinion of the writer, they should be included as part of a program to prepare teachers of auto mechanics.

Table 211. Course content needed in auto mechanics courses

Fundamentals of algebra
Fundamentals of trigonometry
Concepts and principles of physics
Fundamentals of psychological concepts
Principles of motivation and learning
Psychological development of the individual
Application of human learning principles to classroom situations
Writing as a means to communicate ideas, judgements, observations, and other information
Reading and observations as a source of information
Principles of oral communications
Group communication problems and practices
Principle elements of mechanical drafting
Fundamentals of freehand drafting
Design principles
Materials, products, processes of finishing
Direct current circuit analysis
Alternating current circuit analysis
Familiarization with and practical application of modern electronic test equipment
Theory and application of semi-conductor devices
Electric motor theory and controls
Basic metal casting procedures
Heat treating principles and techniques
Use of metal working tools
Fundamental metal machine operations
Relationship between structure and properties of metals
Principles and practices of sheet metal fabrication
Welding ferrous and nonferrous metals
Sources, development, and application pf power
The automobile industry
Operating principles of automobile components
Service of automobile components
Principles and application of fluids (hydraulics)
Industrial education--its place in society
Planning and layout of industrial shops, laboratories, and classroom facilities
Initiating and maintaining effective safety programs

The preceding list of recommended course content is not meant to be an all-inclusive list. Other content as well may prove to be important to the individual, and of course the teaching methods content, the discussion of which follows, should also be included in a teacher-preparation curriculum.

The purpose of the section of the questionnaire which contained elements of methods of teaching was not to distinguish between what should or should not be included in methods, but to determine the relative importance of the content. It was assumed that all respondents would agree that all of the elements were needed. To allow for disagreement, however, the number-one rank, 'Not needed', was included.

The frequencies listed in Table 38 establish that most of the respondents believed the content listed to be a necessary part of the methods courses. Although the percentages which are in the 'Essential' and 'Important' categories represent a large majority of respondents, there are some differences in apparent degree of importance placed on the content.

By considering only the 'Essential' replies, the order of importance by highest frequency of response is: 1. developing courses, 2. determining course content, 3. developing competency in the teaching act, 4. evaluating student progress, 5. selecting and caring for equipment, 6. understanding the teacher's role in the profession, 7. understanding public relations, 8. planning daily lessons, and 9. preparing a budget. By marking 'Essential' the respondent indicated that he thought the teaching-option graduate should have a high level of proficiency in the element. By marking 'Important' the respondent indicated that practice should be provided, but the high level of proficiency was not required. By combining both categories, 'Essential' and 'Important', the percent who favored practice of the element can be determined. This manipulation produced the following order: 1. determining course content, 2. developing competency in the teaching act, 3. developing courses, 4. selecting and caring for equipment, 5. evaluating student progress, 6. understanding public relations, 7. understanding the

teacher's role in the profession, 8. planning daily lessons, and 8. preparing a budget. The last two have equal percentages.

The first five elements of the last list each had response percentages of 92.0 or more. From this, the writer would conclude that a methods course or sequence of courses should include, at the very minimum, those five elements. Opportunity should be provided to practice those elements and a high degree of proficiency should be reached in at least the first three--determining course content, developing competency in the teaching act, and developing courses.

This study was designed as a follow-up study of graduates of the industrial-education curricula at Iowa State University. Its purpose was to aid in developing an improved industrial-education program. The study should prove valuable to educators because the needs expressed by both industry-option and teaching-option graduates are reported in the findings.

Recommendations for further study:

1. Determine methods of implementing the existing content areas with additional practical application of mathematics, science, and communicative skills.
2. Conduct a detailed study of the requirements of the industry areas of work.
3. Investigate innovative methods of keeping abreast with changes in industry and education.
4. Discover methods of encouraging student-initiated program planning.

SUMMARY

The purpose of this study was to aid in developing an improved industrial-education program by seeking out opinions held by graduates relative to their needs, and using these opinions as a means to determine the recommended course emphasis.

The major objectives of the study were:

1. To group the graduates according to factors relating to their occupational classification and specific area of work.
2. To determine the degree of importance that is placed on course content within major instructional areas.
3. To determine what course content is considered necessary to enable the graduates to meet the needs of the various occupations.

The data were collected with a mailed questionnaire which was sent to the 305 graduates who received Bachelor of Science degrees from August, 1959, through August, 1969.

The findings were arranged in two major divisions--status of the graduates, and importance of course content.

Status of the Graduates

Of the 248 who responded to the questionnaire, 113 reported employment in some phase of education and 135 reported employment in industry.

Geographically, 77.0 percent were located in the Midwest, of which 130, or 52.0 percent of the total, were in Iowa.

The median of the reported salary was approximately $10,500 for all graduates; $11,250 for industry employed, and $9,900 for education employed.

Within each of the two major classifications, education employed and industry employed, were several occupational groups and several areas of

work. Frequencies and percentages of replies for all areas and groups for which there were ten or more replies were included in tables.

The education groups were: college or university, senior high school, junior high school, and vocational-technical.

Each of the two areas of work had several categories within. The instruction area of work categories were: multifield industrial laboratory instruction, singlefield industrial laboratory instruction, area unit industrial laboratory instruction and non-industrial education instruction. Within each of these categories a further subdivision was made whereby special areas such as general drafting, general wood, auto mechanics, etc. were listed.

The administration area of work categories were: principle, supervisor, superintendent, director, business administrator, coordinator, and buildings and grounds. None of the administration or non-industrial education instruction categories contained ten or more replies, so all administration categories were treated together as were the non-industrial education instruction categories.

The industry occupational groups which had reported frequencies of ten or more were industrial engineering, personnel and/or training administration, and sales and distribution.

There were six industry areas of work in which ten or more reported. They were supervising, managing, service, materials analysis, sales, and training.

Manufacturing firms employed the greatest number but there were many other types of firms reported also. The 35 products reportedly manufactured represented a large variety of industries.

Importance Placed on Course Content

Digests of the content of the courses included in the industrial-education curricula were evaluated with four-point rating scales. Individual tables for each of the course-content areas as evaluated by the industry and education occupational groups and areas of work were included in the findings.

In the general education evaluations there were many similarities between responses of the two occupational classifications. Two content areas, fundamentals of algebra and fundamentals of trigonometry, were rated 'Needed' by 69.9 percent or more of the respondents of both classifications. Similarly, the responses for both classifications indicated that most other physical science and mathematics was 'Not needed'.

The members of the education classification rated psychology content 'Essential' or 'Important' by large percentages, but the industry ratings of the social science content were not particularly decisive.

Biological science content was rated 'Desirable' or 'No value' by at least 80.0 percent.

Agreement existed among all classifications, groups, and areas of work that the communicative arts were of great value. Industry and education employed alike rated the four content digests consistently 'Essential' and 'Important', leaving little question of the need for these skills. Typical of the response frequencies were those of the education occupational classification: writing as a means to communicate, 55.7 percent 'Essential' and 33.6 percent 'Important'; reading and observation, 55.7 percent 'Essential' and 32.7 percent 'Important'; principles of oral

communications, 70.7 percent 'Essential' and 21.2 percent 'Important'; group communication problems and practices, 59.2 percent 'Essential' and 28.3 percent 'Important'.

Greater differences occurred in the ratings of the industrial education core content. In general this content was rated 'Essential' or 'Important' by the education employed and 'Desirable' and 'No value' by the industry employed.

Although differences did occur between the occupational groups and areas of work in the major classifications as well. It was stated that the industrial education core content offers the industry option student opportunity to develop communicative skills and to apply basic mathematics in an atmosphere similar to that which he will encounter in industry.

It was concluded that since it is apparent that most of the vocational selections of graduates have been in a few areas of work in industry or in education, students should be encouraged to decide early in their university experience to select one of the areas of work and concentrate their efforts toward specialization.

The content of the courses generally referred to as methods of teaching was reduced to nine elements, which were rated for the purpose of determining relative value in a curriculum. These nine elements in order of apparent importance were: 1. determining course content, 2. developing competency in the teaching act, 3. developing courses, 4. selecting and caring for equipment, 5. evaluating student progress, 6. understanding public relations, 7. understanding the teacher's role in the profession, 8. planning daily lesson plans, and 8. preparing a budget. The last two had equal

percentages of replies. It was concluded that a minimal methods of teaching sequence should provide opportunity for practice in at least the first five elements.

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APPENDIX A: LETTERS

IOWA STATE UNIVERSITY
OF SCIENCE AND TECHNOLOGY
Ames, Iowa 50010

COLLEGE OF EDUCATION
INDUSTRIAL EDUCATION

April 22, 1970

Dear Industrial Education Graduate:

When you were in college, did you ever wonder just how much benefit the courses you were taking would be to you in the world of work? Most of us at one time or another did. Today on our campus the magic word is relevancy. It seems students are still asking the same question.

You, a graduate of industrial education, realize what is required of an individual to enable him to compete in the work force of today. Because of this, we are calling on you to help the future graduates prepare themselves for their employment.

Enclosed is a survey instrument which is being sent to all industrial education graduates of the 1959-1969 period. Your answers will assist the staff and students to determine what steps might be taken to more adequately prepare industrial-education majors for the type of position held by you.

It will take 10-15 minutes of your time to answer the questions, but you are the only source for this information, which is of great importance to the future of industrial education graduates.

We are grateful for your assistance and would appreciate a reply at the earliest possible time.

Thank you for your cooperation.

Sincerely,

Walter E. Diedrick Jr.

Walter E. Diedrick, Jr.
Assistant Professor, Industrial Education
Project Leader

Lowell L. Carver

Lowell L. Carver, Professor in Charge
of Industrial Education

Enclosure

IOWA STATE UNIVERSITY
OF SCIENCE AND TECHNOLOGY
Ames, Iowa 50010

COLLEGE OF EDUCATION
INDUSTRIAL EDUCATION

Dear Industrial Education Graduate:

Recently you were asked to participate in a study about former students of industrial education at Iowa State University. The objective of this study is to gather information which will enable us to plan a program which will be more beneficial to future graduates of industrial education.

You are the key to the success of this study. Only you can provide the answers to the questions. The more responses we receive the more meaningful the results will be.

I'm sure that you, as an industrial education graduate, realize the importance of a 100% effort.

Another questionnaire has been enclosed in case you have misplaced the first one.

Sincerely,

Walter E. Diedrick Jr.

Walter E. Diedrick, Jr.
Assistant Professor, Industrial Education
Project Leader

Lowell L. Carver

Lowell L. Carver, Professor in Charge
of Industrial Education

Enclosure

IOWA STATE UNIVERSITY
OF SCIENCE AND TECHNOLOGY
Ames, Iowa 50010

COLLEGE OF EDUCATION
INDUSTRIAL EDUCATION

Dear Industrial Education Graduate:

In our survey of industrial education graduates of the 1959-1969 period, you are one of _____ members we have not heard from.

Replies have come in from all corners of the United States. It has been most interesting to renew old acquaintances. We are looking forward to receiving your questionnaire, too.

Another questionnaire has been enclosed in case you have misplaced the first one.

Sincerely,

Walter E. Diedrick Jr.

Walter E. Diedrick, Jr.
Assistant Professor, Industrial Education
Project Leader

Lowell L. Carver

Lowell L. Carver, Professor in Charge
of Industrial Education

Enclosure

APPENDIX B: INSTRUMENT

SURVEY OF IOWA STATE UNIVERSITY INDUSTRIAL-EDUCATION GRADUATES

THERE ARE THREE SECTIONS TO THIS QUESTIONNAIRE. THE FIRST SECTION, QUESTIONS 1-85, IS TO BE COMPLETED BY EVERYONE. THE SECOND SECTION, QUESTIONS 86-126, IS TO BE COMPLETED BY THOSE WHO ARE EMPLOYED IN EDUCATION OR OTHER PUBLIC OR PAROCHIAL INSTUTIONS. THE FINAL SECTION, QUESTIONS 127-133, SHOULD BE COMPLETED BY THOSE WHO ARE EMPLOYED IN INDUSTRY.

SECTION I: To be filled out by everyone. Place a check (✓) before the most appropriate answer to each question.

1. To which option did you receive your undergraduate degree?
   1_____ teaching 2_____ industry
2. In which of the following are you presently employed?
   1_____ teaching 2_____ industry

PLEASE CHECK THE APPROPRIATE COLUMN TO INDICATE HOW MUCH VALUE A KNOWLEDGE OF, OR AN ABILITY IN, THE FOLLOWING TECHNICAL AND ACADEMIC AREAS IS TO YOU IN CARRYING OUT THE RESPONSIBILITIES OF YOUR PRESENT POSITION. NOTE: PLACE A VALUE ON THE SUBJECT MATTER ONLY, DO NOT ATTEMPT TO EVALUATE ON THE BASIS OF A SPECIFIC COURSE YOU MAY HAVE HAD.

4--Essential--A thorough knowledge is needed in carrying out the responsibilities of your present position.
3--Important--Some knowledge is needed to enable you to function in your present position.
2--Desirable--Some knowledge enables you to perform more effectively but it is not required for the position.
1--No Value--There is no need for this subject matter in your present employment.

Physical Science and Mathematics	4-Essential	3-Important	2-Desirable	1-No Value
3. Organic Chemistry				
4. Inorganic Chemistry				
5. Fundamentals of Algebra				
6. Fundamentals of Trigonometry				
7. Analytic Geometry				
8. Objectives and Procedures of Cost Accounting				
9. Calculus				
10. Principles of Statistics				
11. Application of Statistics				
12. Computer Organization				
13. Computer Programing				
14. Concepts and Principles of Physics				

15. If there are other subject matter areas in the physical science and mathematics group that you consider important or essential, or if you wish to emphasize parts of a subject matter area that are important or essential to your work, list them here:

_____

	4-Essential	3-Important	2-Desirable	1-No Value
Social Studies				
16. Economic Principles, Problems and Policies				
17. Structure and Organization of Trade Unions				
18. Problems, Policies and Procedures in Contemporary Labor Relations				
19. Governmental Functions and Processes				
20. Fundamental Psychological Concepts				
21. Principles of Motivation and Learning				
22. Psychological Development of the Individual				
23. Application of Human Learning Principles to Classroom Situations				
24. Analysis of Group, Community, and Cultural Relations				
25. If there are other subject matter areas in the social studies group that you consider important or essential, or if you wish to emphasize parts of a subject matter area that are important or essential to <u>your</u> work, list them here _____				
Biological Science				
26. Organization and Function of Living Systems				
27. Physiology and Anatomy of Humans				
28. If there are other subject matter areas in the biological science group that you consider important or essential, or if you wish to emphasize parts of a subject matter area that are important or essential to <u>your</u> work, list them here _____				
Humanities				
29. Social and Cultural Development of Western Civilization				
30. Political, Economic and Social Development of the United States				
31. If there are other subject matter areas in the humanities group that you consider important or essential, or if you wish to emphasize parts of a subject matter area that are important or essential to <u>your</u> work, list them here _____				
Communicative Arts				
32. Writing as a Means to Communicate Ideas, Judgements, Observations, and Other Information				
33. Reading and Observations as a Source of Information				
34. Principles of Oral Communications				
35. Group Communication Problems and Practices				
36. If there are other subject matter areas in the communicative arts group that you consider important or essential, or if you wish to emphasize parts of a subject matter area that are important or essential to <u>your</u> work, list them here _____				

Industrial Education

		4-Essential	3-Important	2-Desirable	1-No Value
37.	Wood Fabricating Techniques				
38.	Principles of Building Construction				
39.	Chemical and Physical Properties of Wood				
40.	Processing of Wood Products				
41.	Principle Elements of Mechanical Drafting				
42.	Fundamentals of Freehand Drafting				
43.	Architectural Drafting Conventions and Techniques				
44.	Spatial Geometry (descriptive)				
45.	Design Principles				
46.	Materials, Products, Processes of Finishing				
47.	Direct Current Circuit Analysis				
48.	Alternating Current Circuit Analysis				
49.	Familiarization with and Practical Application of Modern Electronic Test Equipment				
50.	Theory and Application of Semi-Conductor Devices				
51.	Television Theory and Service Procedure				
52.	Electric Motor Theory and Controls				
53.	Theory and Application of Computer Circuitry				
54.	Basic Metal Casting Procedures				
55.	Heat Treating Principles and Techniques				
56.	Use of Metal Working Tools				
57.	Fundamental Metal Machine Operations				
58.	Relationship Between Structure and Properties of Metals				
59.	Principles and Practices of Sheet Metal Fabrication				
60.	Welding Ferrous and Nonferrous Metals				
61.	Fundamentals of Metal Spinning				
62.	Sources, Development, and Application of Power				
63.	The Automobile Industry				
64.	Operating Principles of Automobile Components				
65.	Service of Automobile Components				
66.	Principles and Application of Fluids (Hydraulics)				
67.	Fundamentals of Design, Finishing, and Reproduction of Printed Materials				
68.	Techniques of Quantity Production of Printed Materials				
69.	Chemical and Physical Properties of Plastic Resins				
70.	Plastics Processing Methods				
71.	Industrial Education--Its Place in Society				
72.	Planning and Layout of Industrial Shops, Laboratories, and Classroom Facilities				
73.	Initiating and Maintaining Effective Safety Programs				

74. If there are other subject matter areas in the industrial education group that you consider important or essential, or if you wish to emphasize parts of a subject matter area that are important or essential to <u>your</u> work, list them here:

_____

THE FOLLOWING ELEMENTS ARE ALL CONSIDERED TO BE PART OF TEACHING. PLEASE MARK IN THE APPROPRIATE COLUMN TO RANK THEM ACCORDING TO WHAT YOU THINK THEIR IMPORTANCE IN A TEACHER PREPARATION PROGRAM IS, USING THE FOLLOWING NUMBER RANKING.

5--Essential--Graduates of a teacher-preparation program should have a thorough understanding plus a high level of proficiency in the element.
4--Important--Some understanding is needed and an opportunity to practice should be provided.
3--Desirable--Helpful, but discussion and demonstration should be sufficient.
2--Awareness needed--Just being made aware of this is enough.
1--Not needed--Elementary element which can be acquired on the job without being detrimental to students.

	5	4	3	2	1
75. Understanding the teacher's role in the profession					
76. Selecting and caring for equipment					
77. Understanding public relations					
78. Determining Course Content					
79. Developing Courses					
80. Planning daily lessons					
81. Evaluating student progress					
82. Preparing a budget					
83. Developing competency in the teaching act					

84. If there are other subject matter areas in the teacher-preparation group that you consider important or essential, or if you wish to emphasize parts of a subject matter area that are important or essential to your work, list them here:

_____

THE FOLLOWING INFORMATION WILL BE HELD IN STRICT CONFIDENCE.

85. What is your approximate annual salary before taxes. Do not include income from other sources such as interest earned, rentals, or part-time employment.

1_____ less than $6000
2_____ 6001-7000
3_____ 7001-8000
4_____ 8001-9000
5_____ 9001-10000
6_____ 10001-11000
7_____ 11001-12000
8_____ 12001-13000
9_____ 13001-14000
10_____ 14001-15000
11_____ 15001-16000
12_____ 16001-17000
13_____ 17001-18000
14_____ 18001-19000
15_____ 19001-20000
16_____ 20001-21000
17_____ 21001-22000
18_____ 22001-23000
19_____ 23001-24000
20_____ 24001-25000
21_____ over 25000

SECTION II. IF YOU ARE EMPLOYED IN EDUCATION, COMPLETE QUESTIONS 86-126. IF YOU ARE EMPLOYED IN INDUSTRY, COMPLETE SECTION III, QUESTIONS 127-133.

86. Name of school or district_____

87. In which one of the following 7 groups do you classify your major responsibility?

1_____ college or university
2_____ senior high school
3_____ junior high school
4_____ elementary
5_____ handicapped
6_____ vocational-technical
7_____ other (please specify)
_____

88. How do you classify your assignment in industrial education?

1_____ full time
2_____ 3/4 time
3_____ 1/2 time
4_____ 1/4 time

INDICATE IN WHICH OF THE FOLLOWING 5 AREAS OF WORK YOU SPENT THE LARGEST PERCENTAGE OF YOUR TIME IN 1969. (MARK MORE THAN ONE IF NECESSARY.)

Area I

89_____ Multifield industrial laboratory instruction (comprehensive general shop)

Area II - Single field industrial laboratory instruction (general unit shop)

90_____ General Drafting
91_____ General Electricity
92_____ General Graphic Arts
93_____ General Metals
94_____ General Plastics
95_____ General Power
96_____ General Wood
97_____ Other (please specify)

Area III - Area unit industrial laboratory instruction (unit shop)

98_____ Drafting (Mechanical)
99_____ Drafting (Architectural)
100_____ Electricity
101_____ Electronics
102_____ Graphic Arts
103_____ Foundry
104_____ Machine Metals
105_____ Sheet Metal
106_____ Metallurgy
107_____ Plastics
108_____ Welding
109_____ Automechanics
110_____ Fluids
111_____ Other (please specify)
_____

Area IV - Non-industrial laboratory instruction

112_____ Professional subjects
113_____ Related subjects
114_____ Guidance and/or counseling
115_____ Other (please specify)_____

Area V - Administration

116_____ Principal
117_____ Supervisor
118_____ Superintendent
119_____ Director
120_____ Business administrator
121_____ Coordinator
122_____ Buildings and grounds
123_____ Other (please specify)
_____

124. Briefly describe your present position (high school industrial arts teacher, trade and industrial coordinator, etc.)_____

_____

125. How do you classify the school in which you are employed?

1_____ college or university
2_____ vocational-technical
3_____ high school 10-12
4_____ high school 9-12
5_____ jr.-sr. high school 7-12
6_____ junior high school 7-9
7_____ elementary K-6
8_____ elementary K-8
9_____ other (please specify)
_____

126. What is the approximate student population of the school in which you are employed?

1_____ 1-50
2_____ 51-100
3_____ 101-200
4_____ 201-500
5_____ 501-1000
6_____ 1001-2500
7_____ over 2500

SECTION iii: TO BE COMPLETED BY THOSE EMPLOYED IN INDUSTRY.

127. Name of firm_____

128. Into which one of the following groups do you classify your position.

1_____ Industrial Engineering
2_____ Budgeting
3_____ Purchasing
4_____ Sales and Distribution
5_____ Public Relations
6_____ Personnel and/or Training Administration
7_____ Other (please specify)
_____

129. Which one of the following areas of work best describes your major responsibility

1_____ Promotion (of products, services or good will)
2_____ Supervising
3_____ Purchasing
4_____ Managing
5_____ Training
6_____ Sales
7_____ Service
8_____ Writing
9_____ Materials analysis (research and development)
10_____ Other (please specify)
_____

130. Please state your title_____

131. Please briefly describe your position. (product designer, production supervisor, etc._____

_____

132. What is the nature of this firm or company? (Auto manufacturing, electronic manufacturing, etc.)_____

_____

133. What is the approximate number of employees employed by your firm or company at your location?

1_____ 1-20
2_____ 21-50
3_____ 51-100
4_____ 101-250
5_____ 251-500
6_____ 501-1000
7_____ over 1000