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ABSTRACT

This third in a series of eleven learning modules on program planning, development, and evaluation is designed to develop secondary and postsecondary vocational teachers' skills in analyzing, reporting, and disseminating community survey data. Introductory sections relate the competencies dealt with here to others in the program and list both the enabling objectives for the five learning experiences and the resources required. Materials in the learning experiences include required readings (on data analysis, reporting, and disseminating, including presenting data through tables and graphs), self-check quizzes, model answers, a case situation, and the teacher performance assessment form for use in evaluation of the terminal objective. (The modules on program planning, development, and evaluation are part of a larger series of 100 performance-based teacher education (PBTE) self-contained learning packages for use in preservice or inservice training of teachers in all occupational areas. Each of the field-tested modules focuses on the development of one or more specific professional competencies identified through research as important to vocational teachers. Materials are designed for use by teachers, either on an individual or group basis, working under the direction of one or more resource persons/instructors.) (SH).

MODULE

A-3

Report the Findings of a Community Survey

MODULE A-3 OF CATEGORY A—PROGRAM PLANNING, DEVELOPMENT, AND EVALUATION
PROFESSIONAL TEACHER EDUCATION MODULE SERIES

The Center for Vocational Education
The Ohio State University

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FOREWORD

This module is one of a series of 100 performance-based teacher education (PBTE) learning packages focusing upon specific professional competencies of vocational teachers The competencies upon which these modules are based were identified and verified through research as being important to successful vocational teaching at both the secondary and post-secondary levels of instruction. The modules are suitable for the preparation of teachers in all occupational areas.

Each module provides learning experiences that integrate theory and application; each culminates with criterion referenced assessment of the teacher's performance of the specified competency. The materials are designed for use by individual or groups of teachers in training working under the direction and with the assistance of teacher educators acting as resource persons. Resource persons should be skilled in the teacher competency being developed and should be thoroughly oriented to PBTE concepts and procedures in using these materials

The design of the materials provides considerable flexibility for planning and conducting performance-based preservice and inservice teacher preparation programs to meet a wide variety of individual needs and interests The materials are intended for use by universities and colleges, state departments of education, post-secondary institutions, local education agencies, and others responsible for the professional development of vocational teachers. Further information about the use of the modules in teacher education programs is contained in three related documents **Student Guide to Using Performance-Based Teacher Education Materials, Resource Person Guide to Using Performance-Based Teacher Education Materials** and **Guide to Implementation of Performance-Based Teacher Education.**

The PBTE curriculum packages are products of a sustained research and development effort by The Center's Program for Professional Development for Vocational Education. Many individuals, institutions, and agencies participated with The Center and have made contributions to the systematic development, testing, revision, and refinement of these very significant training materials Over 40 teacher educators provided input in development of initial versions of the modules, over 2,000 teachers and 300 resource persons in 20 universities, colleges, and post-secondary institutions used the materials and provided feedback to The Center for revision and refinement

Special recognition for major individual roles in the direction, development, coordination of testing, revision, and refinement of these materials is extended to the following program staff: James B Hamilton, Program Director, Robert E Norton, Associate Program Director, Glen E. Fardig, Specialist, Lois Harrington, Program Assistant, and Karen Quinn, Program Assistant. Recognition is also extended to Kristy Ross, Technical Assistant, Joan Jones, Technical Assistant, and Jean Wisenbaugh, Artist for their contributions to the final refinement of the materials. Contributions made by former program staff toward developmental versions of these materials are also acknowledged. Calvin J. Cotrell directed the vocational teacher competency research studies upon which these modules are based and also directed the curriculum development effort from 1971–1972 Curtis R. Finch provided leadership for the program from 1972–1974.

Appreciation is also extended to all those outside The Center (consultants, field site coordinators, teacher educators, teachers, and others) who contributed so generously in various phases of the total effort Early versions of the materials were developed by The Center in cooperation with the vocational teacher education faculties at Oregon State University and at the University of Missouri-Columbia. Preliminary testing of the materials was conducted at Oregon State University, Temple University, and University of Missouri-Columbia.

Following preliminary testing, major revision of all materials was performed by Center Staff with the assistance of numerous consultants and visiting scholars from throughout the country

Advanced testing of the materials was carried out with assistance of the vocational teacher educators and students of Central Washington State College, Colorado State University, Ferris State College, Michigan, Florida State University, Holland College, P.E I., Canada, Oklahoma State University, Rutgers University, State University College at Buffalo, Temple University, University of Arizona; University of Michigan-Flint; University of Minnesota-Twin Cities; University of Nebraska-Lincoln, University of Northern Colorado, University of Pittsburgh, University of Tennessee, University of Vermont, and Utah State University.

The Center is grateful to the National Institute of Education for sponsorship of this PBTE curriculum development effort from 1972 through its completion Appreciation is extended to the Bureau of Occupational and Adult Education of the U S Office of Education for their sponsorship of training and advanced testing of the materials at 10 sites under provisions of EPDA Part F, Section 553 Recognition of funding support of the advanced testing effort is also extended to Ferris State College, Holland College, Temple University, and the University of Michigan-Flint.

Robert E Taylor
Executive Director
The Center for Vocational Education

THE CENTER FOR VOCATIONAL EDUCATION
The Ohio State University • 1960 Kenny Road • Columbus Ohio 43210

The Center for Vocational Education's mission is to increase the ability of diverse agencies, institutions, and organizations to solve educational problems relating to individual career-planning, preparation, and progression The Center fulfills its mission by

- Generating knowledge through research
- Developing educational programs and products
- Evaluating individual program needs and outcomes
- Installing educational programs and products
- Operating information systems and services
- Conducting leadership development and training programs

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The American Association for Vocational Instructional Materials (AAVIM) is an interstate organization of universities, colleges and divisions of vocational education devoted to the improvement of teaching through better information and teaching aids

INTRODUCTION

A community survey is designed to provide comprehensive information concerning current employment and future labor requirements by specific occupations. It is also designed to determine training needs to fulfill these requirements. The information is gathered from a specific, predetermined area of the community.

A well-conducted community survey can provide vocational educators with needed information about occupational opportunities, training needs, resources, training facilities, and individual needs and goals. This information provides a solid base for vocational curriculum revision.

The success of the community survey in determining the right development of vocational education within the community depends greatly on the skill with which the data from the survey is processed and presented. The data itself is relatively unusable until it has been organized and presented to those who need to know about it.

This module is designed to give you skill in analyzing survey data, reporting clearly and concisely the results of that analysis, and disseminating the findings. Modules dealing with planning and conducting the community survey (A–1 and A–2) present the information and practice needed to prepare you for this phase.

This module is written to give you the skills you need to **report the findings** of a community survey. However, it is recognized that in many school situations, you will not have **sole** responsibility for reporting the findings of a community survey, but rather will be **sharing** this responsibility with others.

ABOUT THIS MODULE

Objectives

Terminal Objective: While working in an actual school situation, report the findings of a community survey. Your performance will be assessed by your resource person, using the Teacher Performance Assessment Form, pp. 61–62 (*Learning Experience V*).

Enabling Objectives:

1. After completing the required reading, demonstrate knowledge of the steps and important considerations involved in organizing data from a community survey (*Learning Experience I*).
2. After completing the required reading, demonstrate ability to analyze data from a community survey (*Learning Experience II*).
3. After completing the required reading, demonstrate ability to present community survey data using appropriate tables and graphs (*Learning Experience III*).
4. After completing the required reading, use the information provided in a given case situation to outline a report and a dissemination plan for a community survey (*Learning Experience IV*)

Prerequisites

To complete this module, you must have competency in preparing for and conducting a community survey If you do not already have these competencies, meet with your resource person to determine what method you will use to gain these skills One option is to complete the information and practice activities in the following modules

- *Prepare for a Community Survey*, Module A–1
- *Conduct a Community Survey*, Module A–2

Resources

A list of the outside resources which supplement those contained within the module follows. Check with your resource person (1) to determine the availability and the location of these resources, (2) to locate additional references in your occupational specialty, and (3) to get assistance in setting up activities with peers or observations of skilled teachers, if necessary. Your resource person may also be contacted if you have any difficulty with directions, or in assessing your progress at any time.

Learning Experience I

No outside resources

Learning Experience II

Optional

Reference: Young, Robert K. and Donald J. Veldman. *Introductory Statistics for the Behavioral Sciences*. Second Edition. New York, NY. Holt, Rinehart & Winston, Inc , 1972.

Reference. Freund, John E. *Modern Elementary Statistics*. Fourth Edition. Englewood Cliffs, NJ Prentice-Hall, Inc., 1973.

A mathematics teacher or other person skilled in data analysis with whom you can consult

Learning Experience III

Optional

A graphics teacher or other person skilled in the graphic and pictorial presentation of information with whom you can consult.

Learning Experience IV

Required

A resource person to review the adequacy of your report outline and dissemination plan

Optional

Reference. Turabian, Kate L. *A Manual for Writers of Term Papers, Theses, and Dissertations*. Fourth Edition. Chicago, IL. University of Chicago Press, 1973.

An English teacher or other person skilled in report writing with whom you can consult

Learning Experience V

Required

An actual school situation in which you can report the findings of a community survey.

A resource person to assess your competency in reporting the findings of a community survey.

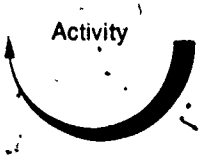
This module covers performance element numbers 18, 19 from Calvin J Cotrell *et al*, *Model Curricula for Vocational and Technical Teacher Education Report No V* (Columbus, OH The Center for Vocational Education, The Ohio State University, 1972) The 384 elements in this document form the research base for all The Center's PBTE module development

For information about the general organization of each module, general procedures for their use, and terminology which is common to all 100 modules, see About Using The Center's PBTE Modules on the inside back cover

Learning Experience I

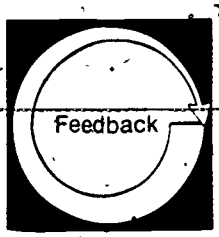
OVERVIEW

After completing the required reading, demonstrate knowledge of the steps and important considerations involved in organizing data from a community survey.



You will be reading the information sheet, Organizing the Data from a Community Survey, pp. 6–8.

You will be demonstrating knowledge of the steps and important considerations involved in organizing data from a community survey by completing the Self-Check, pp. 8–9.



You will be evaluating your competency by comparing your completed Self-Check with the Model Answers, pp. 11–12.

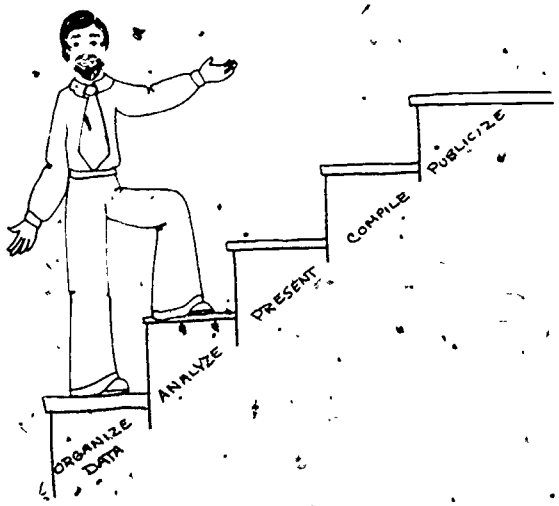
Activity

For information pertaining to the organization of data from a community survey, read the following information sheet.

ORGANIZING THE DATA FROM A COMMUNITY SURVEY

Before you get to this point in the process of completing a community survey, you and your survey team will have (1) determined what information you wished to gather, (2) developed or adapted instruments to gather that data, and (3) completed the data collection using those instruments. Now you are ready to make use of the data you gathered and to report your findings. To do this, you need to complete the following steps

- You need to **organize the data** in ways which relate specifically to the survey questions which you designed and the types of recommendations which may stem from those questions.
- You must **analyze that data.**
- You must **present your analysis in tabular and graphic forms** which highlight its relevance to the original survey questions
- You must **compile the findings** into a written report
- You need to **disseminate the report** to ensure that school officials, the public, and interested others are made aware of those findings



Organizing the Data

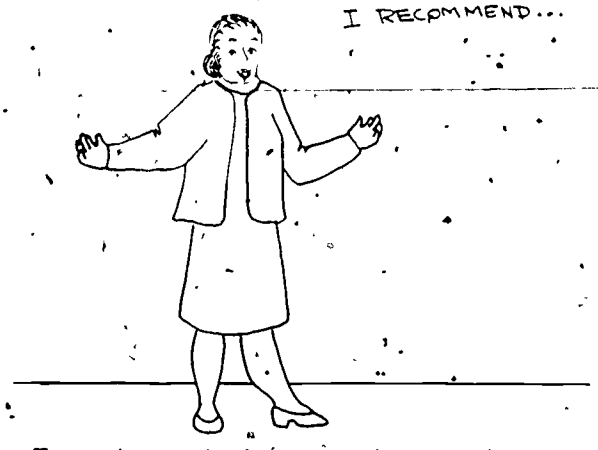
Whether you are processing the data by hand or by computer, the analysis process will be simpler if you have planned in advance specifically what questions the data should answer and have used instruments designed to elicit that data. Generally, a community survey is designed to answer the following types of questions.

- Are the vocational programs now being offered in the community adequate with respect to student occupational interests?
- Are the expressed interests and occupational plans of the students realistic in terms of the manpower needs of the community?
- Are the vocational programs now being offered adequate in terms of the manpower needs of the community?

In order to answer these questions, you will need to **summarize** the relevant data concerning (1) **student occupational interests,** (2) **manpower needs,** and (3) the **present vocational program.** Once summarized, the three groups of data can be compared, answers to the previous questions can be formed, and recommendations can be tentatively raised.

For example, assume that in analyzing the data you collect from employers, you note that one large local firm has recently installed a large computer operation. You would need to then check to see if your community offered a program for the training of computer operators. Furthermore, you would need to check your student interest data to see if students indicated any interest in computer training, in working in the community or in that firm, or in working in areas now being handled by computer.

This is an oversimplification perhaps, but the point is that by comparing such data, you would be able to make recommendations for your vocational program's improvement. In the example above, you might conclude that although students haven't expressed interest in being trained as computer operators, the trend indicates that there will be a large market in your community for students trained in those skills. Thus, you could recommend that steps be taken to make students **aware** of this occupational opportunity and to **interest** them in this field. Or, you could recommend that a program for training computer operators be offered somewhere in the community.



To make such recommendations, there are some **additional factors** to be considered Realistically, in suggesting additional programs, you need to consider four basic community factors

Social factors.—The social composition of the community will influence the types of educational programs which will be accepted and or supported. Social factors also determine the amount of federal money available for the support of vocational education

For example, you may find that vocational education is supported more actively in lower socioeconomic communities than in upper middle class communities. Or, you may find that more state and federal support is available for vocational programs in the depressed areas of the country such as the inner city or impoverished rural areas.

Economic factors.—The ability and willingness of the community to provide needed financial support for vocational education is a critical consideration. Other economic factors which need to be considered are (1) average family incomes, (2) percent of unemployed, (3) present and projected housing patterns, and (4) present and projected job opportunities, both locally and nationally

In conducting a community survey and in making decisions based on the findings, the state department of education should be brought into the process because of the financial support it may be asked to provide for proposed new programs.

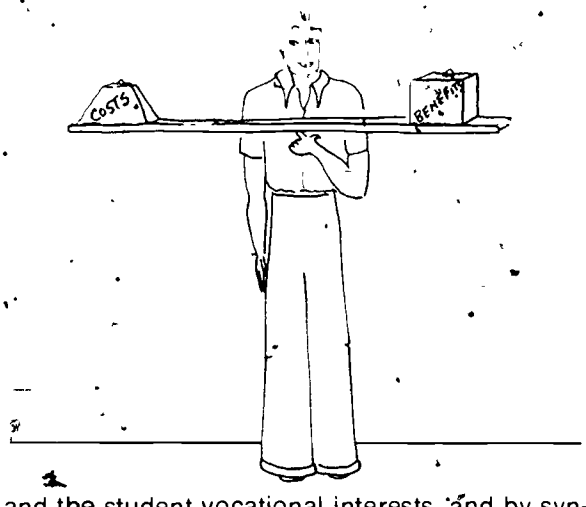
Political factors.—You need to be familiar with the community's political philosophy since this affects the attitudes toward education. Support from local politicians, influential citizens, and the members of the news media is essential if your recommendations are to gain serious consideration.

Educational factors.—A comprehensive analysis of existing educational programs is needed Before new program recommendations can be made, you need to know what the present educational opportunities in the community are.

It is especially important to know the number of vocationally trained individuals that are placed in the job market each year. It is quite possible that the training institutions in your area, both secondary and post-secondary, are already flooding the market with well-trained individuals in certain occupational areas, or that they are gearing up to do so. Additional data on these concerns may be available if your district has conducted a recent student follow-up study.

By working with your vocational advisory committee, local university faculty members, or personnel at the state department, the chamber of commerce, and the local employment bureau, you can locate much of this needed information. You should also consider reviewing recent census data, U.S. labor statistics, and such publications as *The Occupational Outlook Handbook* before final vocational training decisions are made.

Before you make vocational program recommendations that require considerable cost in buildings and equipment, all factors must be carefully weighed By analyzing the manpower needs



and the student vocational interests, and by synthesizing this information in conjunction with the social, economic, political, and educational factors of the community, you can estimate the following.

- the size of the total labor force 5, 10, and 15 years into the future
- the total employment in each particular branch of business and industry
- the educational requirements for all the various occupations
- the total supply of persons in various occupational groups in the target years

One is never able to make exact predictions for target years that are 5, 10, and 15 years into the future. However, the person with the decision-making responsibility must carefully weigh all the

factors involved. Then he or she must work closely with advisory committees, employment agencies, university educators, and community leaders, to help ensure that the best possible decisions will be made.

The following items check your comprehension of the material in the information sheet, Organizing the Data from a Community Survey, pp. 6–8. Each of the three items requires a short essay-type response. Please explain fully, but briefly, and make sure you respond to all parts of each item.

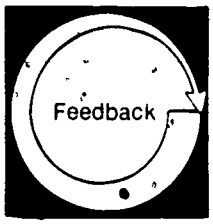
SELF-CHECK

1. What are the steps involved in reporting the findings of a community survey? Briefly describe the function of each.

2. What are the types of questions which a community survey is designed to answer? How would you categorize the data from your survey to relate it to these questions?

3. What are the factors which need to be taken into account when making recommendations from a community survey? Give examples of ways in which these factors may shape the types of recommendations made.

NOTES



Compare your written responses on the Self-Check with the Model Answers given below. Your responses need not exactly duplicate the model responses, however, you should have covered the same **major** points.

MODEL ANSWERS

1 There are five principal steps involved in reporting the findings from a community survey. The first is the organization of the data so that they can easily be related to the questions which the survey was designed to answer. These questions determine the significance of the information obtained from the survey. Therefore, they must determine how the data need to be put together, how sections need to be compared and contrasted, and how to present the data so that clear answers to those questions are given.

The second step is analyzing the data. In this step the data are processed so as to obtain all the pertinent information relating to the survey questions.

The third step is presenting the data in ways which others can readily understand and which they can clearly relate to the survey questions. This presentation may involve the construction of tables and charts which simplify the material and appeal to the visual sense.

The fourth step is compiling a report which sets forth the findings in relation to the survey questions and makes appropriate recommendations from those findings.

The fifth step is the crucial one of making the results public so that they may influence future decisions and developments in vocational education.

2 The types of questions which a community survey seeks to answer relate to two broad categories of concern. First, what are the needs and interests of the students and community in relation to vocational education? And second, how adequate are the present vocational programs for meeting those needs?

Thus, the following three questions are generally relevant. Are the vocational programs now being offered in the community adequate with respect to student occupational interests? Are the expressed interests and occupational plans of the students realistic in terms of the manpower needs of the community? And, are the vocational programs now being offered adequate in terms of the manpower needs of the community?

The data will need to be grouped in such a way as to reveal the present occupational interests of the students, and the manpower needs of the community. The data will also need to be grouped to reveal the vocational programs which presently exist within the community or within the schools.

3 There are four principal factors which need to be taken into account when making recommendations from a community survey. The first is economic factors which relate to the problem of financing vocational programs within the community. Unless the community is both able and willing to finance further vocational programs, it is useless to recommend them. Any recommendation should take into consideration the financial resources potentially available.

For example, the community may not be able to afford to finance the equipment necessary for the introduction of a computer programming course within the vocational school. Therefore, it may be better to recommend the introduction of a cooperative training program between the vocational training institution and an industry which has facilities available for the training of senior students.

Second, there are political factors which need to be considered in any recommendation. Support of the community and the leaders of the community is essential for the development and expansion of vocational education programs within vocational institutions. For example, it could be very helpful to obtain the support of the local chamber of commerce for the introduction of a new vocational program in the school. Its installation would certainly be difficult if they opposed it.

Third, there are educational factors which must be considered in any recommendations. For example, it is foolish to recommend programs which will compete with other vocational pro-

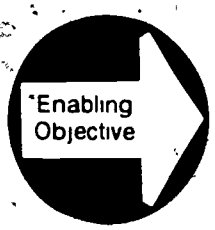
grams in the community if there are not enough students to support both. If the existing program is inadequate, it is better to seek to improve it before recommending the introduction of a competing program.

Finally, there are important social factors which must be taken into account. For example, community needs may make it advisable to emphase the **retraining** functions of vocational programs, as well as the **initial** training functions of programs, if the community is to support any expansion in those programs.

LEVEL OF PERFORMANCE: Your completed Self-Check should have covered the same **major** points as the model responses. If you missed some points or have questions about any additional points you made, review the material in the information sheet, Organizing the Data from a Community Survey, pp 6–8, or check with your resource person if necessary.

Learning Experience II

OVERVIEW



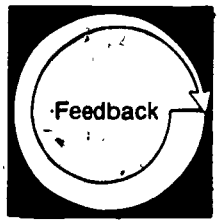
After completing the required reading, demonstrate ability to analyze data from a community survey.

You will be reading the information sheet, Analyzing Data from a Community Survey, pp. 14–23.

You may wish to read the supplementary references, Young and Veldman, *Introductory Statistics for the Behavioral Sciences*, pp. 1–102; and Freund, *Modern Elementary Statistics*, pp. 1–79.

You may wish to meet with a mathematics teacher or other person with expertise in the computations covered in this learning experience to discuss in greater detail methods for analyzing data from a community survey.

You will be demonstrating ability to analyze data for a community survey by completing the Self Check, pp. 24–28.



You will be evaluating your competency by comparing your completed Self-Check with the Model Answers, pp. 29–30.

Activity

For information on methods for analyzing data from a community survey, including coding and summarizing the data, calculating percentages and frequencies, obtaining averages, and assessing variations and differences, read the following information sheet:

ANALYZING DATA FROM A COMMUNITY SURVEY

There are three primary goals which you should be seeking to achieve in analyzing the data. These are—

- to reduce the mass of data obtained from the survey to a size which you can understand and handle
- to draw out important facts from that data
- to present these facts in a way which simply and clearly answers the questions you were exploring in the survey

To achieve these goals, you will need to develop skills in **calculating** survey data, and **constructing** appropriate tables and charts for the presentation of the information.

Data from a community survey may be grouped, averaged, rounded, summarized, and presented in any way which appears to render the findings the most usable. In general, five simple and logical steps are involved in analyzing the data so that it is the most usable. These are (1) coding the information, (2) summarizing it through totals, (3) constructing frequencies and percentages, (4) obtaining averages, and (5) assessing variations and differences.

Not all these steps will be necessary in every survey. The selection of the appropriate steps for any particular survey will depend on the goals of that survey and the type of data obtained from it. However, each of the above steps will be necessary in a comprehensive survey, and all of them are quite simple to undertake with the use of an electronic calculator with a square root function.

Coding the Information

"Coding" is the assignment of numbers, letters, or other symbols to the answers on the questionnaire. Its purpose is to classify the answers of all the questions into meaningful categories so as to facilitate the summary of the data. For example, suppose your questionnaire had included the following statement: "Graduates from the auto mechanics program at Central High School are thoroughly trained for that occupation in industry." You asked your respondents to indicate whether they **strongly agreed, agreed,** were **undecided, disagreed,** or **strongly disagreed** with the statement. It would be very difficult to convey information from that question unless you determined some way of combining the responses.

One way to do this is to give a numerical value to each response and then total them. You may let **strongly agree** equal 5, **agree** equal 4, etc., and **strongly disagree** equal 1. Then each response to

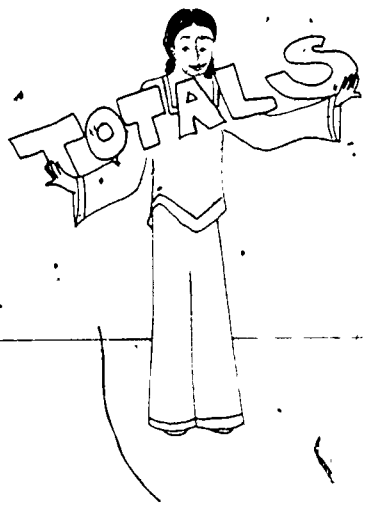
that question will be given its appropriate numerical value—if one response "agrees" with the question it will receive 4, if another response disagrees it will receive 2, and so on.

Going through all the questionnaires and giving them relevant numbers, as described above, is the process of coding. When this has been done, you can see that all the responses to this particular question could then be added together. If there were 20 questionnaires and 20 responses to this particular question, then you can see that a total of around 20 would indicate that nearly every respondent strongly disagreed with the statement. Whereas if there were a large total, say 90 or more, it would indicate that most of the respondents strongly agreed with the statement.

Coding enables you to combine the responses to the questions so that you can indicate what the total response to them was. And this, of course, is the primary purpose of your survey. Usually, you want to know the **community** response, not individual responses.

Summarizing the Information

Once you have coded the information from your survey, the next step is to combine the information into meaningful totals. The aim of this step is to reduce the large mass of figures resulting from the survey and your coding to a smaller number, without losing significant original information from the data. Thus, before you total your figures you need to have thought carefully about the categories of information which you need from your survey. It might be helpful for you to consider the example in Figure 1.



You can see from Figure 1 that survey figures can be combined in many different ways to convey a great deal of information. However, it is important to remember that the fewer the totals, the easier it will be for you to report your findings, and the easier it will be for others to understand them. It might be interesting to know some of these smaller totals (subtotals), but if they are not relevant to the objectives of your survey, then combine them to make the larger totals which you need.

FIGURE 1

SURVEY FIGURES

The following is part of the information received from a survey. Study it and consider how many totals might be constructed from it to report important findings.

Institution	Number of Employees Per Job					
	Accountant	Mechanic	Secretary	Welder	Sales	Clerk
Alpha, Inc.	3	6	15	2	20	12
Beta, Inc.	6	3	20	0	30	22
Gamma, Inc.	10	20	10	15	2	8
Delta, Inc.	4	0	11	8	10	15
City Council	10	10	30	4	0	38
Bureau of Prisons	2	3	4	0	0	10
County Government	20	18	40	6	8	45

First, you may be interested in the total employment of each institution. So you will add up the number of employees across each row. This would enable you to compare the size of the payroll of the various institutions.

Secondly, you may want to know the total number of people employed in the various occupations. You will obtain these figures by adding up each column. This would allow you to compare the numbers of people employed in different occupations in the community.

Thirdly, you may be interested in comparing types and size of employment of private institutions with the public institutions. To do this, you will need to total the relevant figures of the first four institutions, and then those of the last three.

Fourthly, you may be interested in comparing the total numbers employed in the various categories of employment. You could add the totals from the accountants, secretaries, and clerks columns for the total in Business Occupations, the totals from the mechanics and welders columns for the total in Trade and Industrial Occupations, and the total from the sales column for the total in Distributive Occupations. These various categories may also be reported for each institution or each category of institutions.

Constructing Percentages and Frequencies

Percentages.—Often we want to show the relationship between different figures. One of the most common ways to do this is by **percentages**. Simply, these are obtained by placing the two figures which are being compared into a fraction and multiplying the fraction by 100, then dividing the top of the new fraction (the numerator) by the figure on the bottom (the denominator). Study the calculations of percentages and their meanings given in Figure 2.

FIGURE 2

PERCENTAGES

Suppose we want to calculate some percentages from the example given in Figure 1. If we total all the columns, we find that the grand total of people employed is 500. We may want to report the proportion of **accountants** in that total. When we add up the accountants column we get a total of 55. The two figures we want to compare are the accountants to the total of employees, so we place the accountants figure (55) over the total of employees figure (500) and multiply by 100.

$$\frac{55}{500} \times 100$$

We can see that the 100 in the top line will go into the 500 in the bottom line 5 times. This leaves the following new fraction.

$$\frac{55}{5}$$

We now divide 5 (the denominator) into 55 (the numerator) to get 11. Eleven is the percentage figure and we can report that 11% of people are accountants.

Again, we may be interested in reporting what proportion of the total people employed work in public institutions. If we total up the last three rows which give the people employed in the three public institutions and add these, we obtain a figure of 248. We then place this over the grand total of 500 and multiply by 100. Then we divide the numerator by the denominator.

$$\frac{248}{500} \times 100 = \frac{248}{5} = 5\overline{)248.0}\ = 49.6$$

$$\begin{array}{r} 49.6 \\ 5\,\overline{)248.0} \\ \underline{20} \\ 48 \\ \underline{45} \\ 30 \\ \underline{30} \\ 00 \end{array}$$

Thus, we find that 49.6 percent of the employees work in public institutions.

Frequencies.—Sometimes we are more interested in reporting how many figures fall across a range of numbers rather than in reporting each precise figure. For example, if you were reporting incomes, it would be confusing to report every person's income. It would be much more meaningful to report the number, or percentage, of people who received income within various ranges. This is called the **construction of frequencies.** It allows you to considerably reduce your information by combining identical or similar scores by recording the number of times they occur within a range. Study the calculation of frequencies given in Figure 3

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FIGURE 3

FREQUENCIES

Suppose our survey showed that a group of 25 people received the following incomes:

$3,470	$7,390	$9,000	$10,480	$14,690
$5,680	$7,880	$9,250	$12,980	$15,210
$5,970	$8,210	$9,370	$13,230	$15,680
$6,001	$8,480	$9,680	$13,230	$16,862
$6,800	$8,690	$9,990	$13,481	$19,230

We could reduce these figures in a number of different ways by constructing different sized frequencies. So the first thing we must decide is the size of the interval or range which we are going to use. If the range is too large, the information will become meaningless.

For example, if we took a range of $10,000 and reported how many of the above received incomes between $0–$10,000 and how many received incomes between $10,001 and $20,000, we would reduce the information to two figures—15 people in the first range, 10 people in the second. However, that would not be very helpful. If the range is too small, we end up with too much information which makes our reporting too difficult. If we choose a range of $2,000, we can reduce the above information in the following way.

Income Range In Dollars	Frequency (number in the group)
5,000– 7,000	4
7,001– 9,000	6
9,001–11,000	5
11,001–13,000	1
13,001–15,000	4
15,001–17,000	3

We have reduced the information to six figures instead of 25. Notice that we have left out the two extreme figures. We would include these by reporting that one person received less than $5,000 and one more than $17,000.

As a guide to constructing frequencies, it is helpful to note the following general rules.

- We seldom use fewer than 6, or more than 15 classes or groups. The number we choose, of course, will depend on the number of observations we want to group, and on their range.
- We always choose classes which will accommodate all the data. The exception to this rule is, as shown in our example, when there are one or two observations which are extreme cases and fall well away from the rest of the observations. We generally report these as being below or above the range of the groups which we constructed.
- We always make sure that each item goes into only one class; therefore, we must make certain that the groups do not overlap. Notice in the example that we stopped each group range at $7,000, $9,000, $11,000, etc., and began the next range at $7,001, $9,001, $11,001, etc. If, instead, we had made the ranges $5,000–$7,000; $7,000–$9,000, etc., there would be confusion as to which group the income of $7,000 belonged in.
- Whenever possible, we make the class intervals of equal length, that is, we make them cover equal ranges of values. It is generally desirable to make these ranges (intervals) multiples of 5, 10, 100, etc., or other numbers which are easy to work with.

There is another type of frequency distribution which is often used and can portray information in a helpful way. This is called a **cumulative frequency distribution** or **cumulative distribution.** This type of distribution can be made even more functional by adding a "percentage distribution" to it. Study the calculations of cumulative frequencies and percentage frequencies given in Figure 4.

FIGURE 4

CUMULATIVE FREQUENCIES

Let us use the income figures from Figure 3. To construct a cumulative frequency, we do exactly the same as we did to construct the ordinary frequency. That is, we choose our class interval and begin to allot observations to these classes or groups, from the group which contains the lowest numbers in its range to the highest. However, this time for each frequency we add the frequencies below it.

Income Range in Dollars	Frequency	Cumulative Frequency	Cumulative Percentage
Above 17,000	1	25	100
15,001–17,000	3	24	96
13,001–15,000	4	21	84
11,001–13,000	1	17	68
9,001–11,000	5	16	64
7,001– 9,000	6	11	44
5,001– 7,000	4	5	20
Below 5,001	1	1	4

If you study the above table, you will notice that the cumulative frequency column is obtained by adding up all the frequencies in the frequency column within and below the class or group for which you are obtaining the cumulative frequency. For example, the cumulative frequency for the class \$9,001–\$11,000 is obtained by adding up the frequency of 5 within that class, and the frequencies 6, 4, and 1 below; 5 + 6 + 4 +1 = 16.

The cumulative percentage is obtained by placing each cumulative frequency number over the total of observations and converting it to a percentage. Thus, the cumulative percentage for the above class is obtained by placing the 16 over the total of 25, multiplying by 100 and completing the equation.

$$\frac{16}{25} \times 100 = 16 \times 4 = 64\%$$

Notice that this time the 25 goes into the 100 four times, leaving 4 on the top line to be multiplied by 16 to give us the percentage.

The cumulative categories above tell us how many people fall within and below the class we are considering. For example, we are able to say that 16 people, or 64% of our group, receive incomes of \$11,000 or less. Again, we can say that 21 people, or 84% of our group, receive incomes of \$15,000 or less.

Another type of frequency distribution which is very important in survey work is called a **categorical distribution.** We construct these in much the same way as the frequencies studied. We decide how many categories to use and what kind of items each category is to contain, making sure that all of the items are accommodated and that there are no ambiguities. Frequently we must also include a category labeled "others" or "miscellaneous" so that all observations can be included.

When dealing with categorical distributions we do not have to worry about class limits, etc., but we do have a more serious problem of ambiguity. Thus, we must be careful and explicit in defining what each category is to contain. For example, if we wanted to classify occupations, it would be difficult to decide where to put a farm manager if our table contained (without qualification) the categories "farmers" and "managers." For this reason, it is often advisable to use standard categories developed by the Bureau of the Census and other government agencies. Sample 1 is an example of a categorical or qualitative distribution.

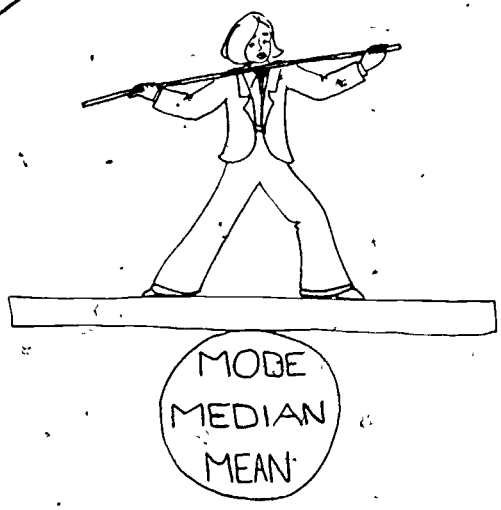
SAMPLE 1

CATEGORICAL OR QUALITATIVE DISTRIBUTION

Category	Number of Persons Employed
Pilots and copilots	10,112
Other flight personnel	4,233
Pursers and flight attendants	8,967
Meteorologists and dispatchers	1,968
Mechanics	26,597
Other hangar and-field personnel	34,560
Office employees	31,645
All others	9,347
Total:	127,429

Obtaining Averages

There are three different figures which we can roughly call averages These are the **mode,** the **median,** and the **mean** (or **arithmetic mean**). They are also called "measures of location" or "measures of central tendency" or "measures of position," because they provide numbers which indicate the "center," "middle," or the "most typical" of a set of numbers. We use one of these figures to describe the characteristics of the total group from which it came. Therefore, it can be an important descriptive figure.



The Mode.—The **mode** is the easiest of the three measures to obtain, but it is also most subject to fluctuation when the values of a few scores are changed. Simply, it is the value which occurs with the highest frequency. If we look back at the information given in Figure 4, we can see that the highest number in the frequency column is 6. Therefore, we can say that $7,001–$9,000 is the modal range of incomes.

Sometimes we get two numbers which have the same greatest frequency. In this case we have two modes and the group of numbers are said to be **bi-modal.** Looking at the set of figures in Figure 4, we can see that the incomes group around the mode, but also they tend to group around the range of $13,001–$15,000. That is, this set of figures are tending to be bi-modal.

It is often much more informative to report that sort of information than to report the average income. The mode may also be the better figure to use to describe the average when a set of figures contains very few extreme cases. These extreme cases will tend to distort the average, but not the mode.

For instance, suppose we surveyed six firms and found that four of them employed 3 account clerks each, one smaller firm employed only 1 account clerk, and the other firm, which was much larger, employed 23 account clerks. We add these figures together to get a total of 36 account clerks employed. If we divide this figure by 6 (representing the six firms), we could report that the average number of account clerks employed per firm was 6. However, this is obviously very inaccurate information, for it is at least twice the number of account clerks employed in five of the six firms. The one large firm is distorting the figure.

It would be much more indicative of the real situation if we used the mode "3" and reported that typically, firms employed 3 account clerks. Our information is now quite accurate for four of the six firms Thus, the mode may be helpful in the following three situations: (1) when a quick and simple average is required, (2) when it is helpful to know that figures in a total are clustering around two quite different locations—the bi-modal situation,

and (3) when a very small number of figures making up a total are contributing a disproportionate amount to that total.

The Median.—Another average which can be used when an extreme value in a set of scores will have a pronounced effect on the mean is called the **median.** This is the value of the middle item (or the mean of the values of the two middle items) when the data are arranged in an increasing or decreasing order of magnitude. Another way of looking at it is that it is the point on a scale below which 50 percent of the cases fall. If we have an odd number of items, there is always a middle item whose value is the median.

For example, the median of the five numbers 5, 10, 2, 7, and 8 is **7,** as can easily be verified by first arranging the numbers according to size. Again, the median of the nine numbers 3, 5, 6, 9, 9, 10, 12, and 13 is **9.** If, on the other hand, we have an even number of items, there is never a middle item, and so the median is the average of the two middle items. For instance, the median of the six numbers 3, 6, 8, 10, 13, and 15 is 8 + 10 divided by 2, which equals **9.** It is halfway between the two middle values.

The Mean.—The **mean** is the most common measure of central tendency, and is by far the most useful. It is sometimes called the "arithmetic mean" and is the figure which we most commonly call the "average." It is simply calculated by dividing a total by the number of items which went into the total. For example, to get the mean of the following numbers, 4 9, 4 7, 5 1, 5 6, we first add them together to obtain the total, 4.9 + 4.7 + 5.1 + 5.6 = **20.3.** Then we divide this total by 4 because there were four items which we added together to get the total. This gives us a mean of **5.075.**

Study the calculations of obtaining the mean for a frequency distribution given in Figure 5

FIGURE 5

MEAN OF A FREQUENCY DISTRIBUTION

We can only obtain an approximate figure for the mean of a frequency distribution, because we have lost the exact original figures in the class interval Let us consider the income example from Figure 4.

Income Range in Dollars	Class Mark in Dollars	Frequency	Products in Dollars
Above 17,000	19,230.00	1	19,230.00
15,001–17,000	16,000.50	3	48,001.50
13,001–15,000	14,000.50	4	56,002.00
11,001–13,000	12,000.50	1	12,000.50
9,001–11,000	10,000.50	5	50,002.50
7,001– 9,000	8,000.50	6	48,003.00
5,001– 7,000	6,000.50	4	24,002.00
Below 5,001	3,470.00	1	3,470.00
		Total:	$260,711.50

The first step is to obtain the **class mark.** This is the midpoint of the class interval. For example $16,000.50 is the midpoint of the class interval $15,001–$17,000. This is easily obtained by adding the two figures together in the class interval and dividing by 2. (15,001 + 17,000 = 32,001. 32,001 divided by 2 = 16,000.50.) Then you multiply each class mark by the frequency to obtain the products column.

Notice we had to go back to the original data in Figure 3 to obtain the two extreme figures. We then add up the products column to get the total. This total we will divide by the total of the frequency column, 25, to get a mean of $10,428.46. It is interesting to note that if we had totaled the separate figures given in Figure 3 from which we constructed the frequency distribution and obtained the mean from that total, we would have obtained a mean of $10,437.86. This figure is very close to the figure we have obtained from the frequency distribution.

If we now study the original set of figures given in Figure 3, we can compare each of the figures of central tendency from these scores The **mode**—the most frequently occurring score—is $13,230, it is the only score to occur more than once. The **median**—the midmost score—is the 13th score, $9,370. The **mean**—the total of all the scores divided by the number of scores—is $10,437 36 In this case, if we look at the frequency distribution of these scores given in Figure 4, we are probably giving a more accurate picture of the sort of income which the majority of people are enjoying if we report the median, the lowest of the three scores in this particular case As we stated above, the median is least affected by extreme scores

However, if we consider the frequency distribution of these scores given in Figure 5, we see that the interval with the highest frequency—the modal range—is $7,001–$9,000 If we take the class mark of this interval as the mode, we can see that this gives a more accurate picture of the type of income which the majority of the group enjoys, for some 16 of the 25 cluster around this figure

Assessing Variations and Differences

An important characteristic of most sets of data is that the values are generally **not all alike.** Thus, while it is important to determine a score which is the **most characteristic score** as we have done in studying the mode, median, and mean, it is clear that such a score does not completely describe a set of data. It is not only helpful to know the most characteristic score, but also to know how individual scores differ from that score—that is, how the individual scores vary. For example, if we compare the following two sets of figures, we find that they have a similar total—30—and a similar mean—6. How-

ever, we can see that there is much greater variation among the scores in the second set than in the first.

(a) 5, 6, 6, 6, 7
(b) 1, 2, 8, 9, 10

If they represented the hourly rates of two different groups of workers, we can see that the differences among the figures would tell us a great deal about spread of skills in the two groups. In the first, the rates are fairly equal. In the second class, three people earn high hourly rates while two earn very low rates. Reporting the total and the mean would not reveal this difference among the rates—their spread. The two most common figures used to give an indication of variability among scores are called (a) the range, and (b) the standard deviation..

Range.—The **range** is simply the difference between the values of the largest and smallest scores in a distribution. It is the easiest measure of variability to obtain, but like the mode, it is the least stable. Nevertheless, it often can give a very helpful indication of the spread of scores.

Taking our example above, we subtract the lowest rate in the first group, which is 5, from the highest rate, 7, to obtain a range of 2. In the second group we subtract the lowest rate, 1, from the highest rate, 10, to get a range of 9. These two figures would immediately give us an idea of the spread of rates in the two different groups, even though the means are the same.

However, the problem with this measure of range is that we do not know whether one rate is distorting the range. What we are really interested in when we are considering the variability of rates is whether most of the rates are tending to bunch closely around the most characteristic rate—the mean—and, therefore, are really very similar to the mean. Or, are most of the rates tending to spread well away from the mean? This type of information tells us just how representative a figure the mean really is.

This is very important when we remember that often we will only be reporting means from the hourly rates we have obtained in our survey data. It is obvious, therefore, that a helpful figure of variability would be a figure which tells us the way in which the rates vary or differ from the mean. This figure is called the standard deviation.

Standard Deviation.—The **standard deviation** is a figure which is really telling us the **average amount which the numbers in a total differ from the mean.** For example, if we take the hourly rates given previously, we can subtract the mean, 6, from each one to obtain the amount which each of the scores differs from that mean. Taking the second group we get the following scores of difference, −5, −4, 2, 3, 4. You will notice that if you add these figures up you obtain zero, which is always the case when you add up deviation scores from a mean.

To overcome this problem we square the deviation scores (i.e., multiply the number by itself) which removes the negative signs and then add them together (25 + 16 + 4 + 9 + 16 = 70). Then, we divide that total by the number which went into it, in this case 5, to get the average amount. This gives us 14. Then, as we squared the scores to remove the negative signs we must finish by taking the square root.

You can most easily find the square root of a number by using an electronic calculator that has a square root function. Alternatively, you will find square root tables in most statistics textbooks. The square root of 14 is 3.74, which is the standard deviation of the second group of hourly rates. If you do the same for the first group, you will get a standard deviation of 0.63. You can see how greatly these two deviation scores differ and, therefore, how much it tells us about the spread of scores in the two different groups. For an easier way of calculating the standard deviation, study Figure 6.

FIGURE 6

STANDARD DEVIATION

It is often a laborious task to subtract the mean from every score to obtain the standard deviation A simpler method is given below

	Scores	Scores Squared
	1	1
	2	4
	8	64
	9	81
	10	100
Totals:	30	250

Notice we are using the hourly-rates given previously The following are the important steps

1 Square each of the scores (these are given in the scores column)

2 Obtain the total of the scores and also of the squared scores

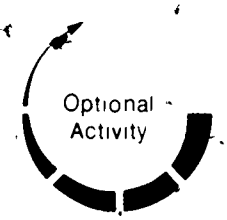
3 Take the total of the scores, square it and divide by the number that went into the total The total of scores in this case is 30, we square this, giving us 900 We divide by the number of scores which went into making the total of 30, namely 5 900 divided by 5 equals 180

4 We subtract this figure from the total of squared scores, 250 - 180 = 70

5 We divide this figure again by the number of scores in our original total, 5 70 divided by 5 = 14

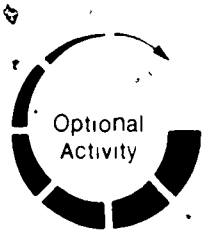
6 Finally, we take the square root of this figure The square root of 14 is 3 74, which is the standard deviation

Notice that in this method we have obtained the same figure as we did above when we dealt with deviation scores The advantage of this method is that you can obtain the standard deviation from your original scores without having to obtain new scores by subtracting the mean



The material given in the information sheet is very basic and simple. You may wish to supplement your understanding of the skills necessary for analyzing data from a community survey by studying the relevant chapters in any introductory textbook on statistics The following are two examples

- Young and Veldman, *Introductory Statistics for the Behavioral Sciences*: pp 1-102
- Freund, *Modern Elementary Statistics*, pp 1-79



You may wish to arrange through your resource person to meet with a mathematics teacher or other person skilled in the computations covered in this learning experience to discuss in greater detail methods for analyzing data from a community survey

The following items check your comprehension of the material in the information sheet, Analyzing Data from a Community Survey, pp. 14–23. Read the directions for each item carefully, and make sure you respond to all parts of each item.

SELF-CHECK

1. If hospital bills are grouped into a frequency table with the classes \$50.00–\$99.99, \$100.00–\$149.99, \$150.00–\$199.99, \$200.00–\$249.99, \$250.00–\$299.99, and \$300.00 or more, decide for each of the following quantities whether it can be determined on the basis of this distribution.

   a. How many of the bills amounted to less than \$150.00?
   b. How many of the bills amounted to \$150.00 or less?
   c. How many of the bills amounted to more than \$200.00?
   d. How many of the bills amounted to \$200.00 or more?
   e. How many of the bills amounted to \$500.00 or more?
   f. How many of the bills amounted to less than \$175.00?

2. A community survey yielded the following figures for the weekly wages of employees within a particular firm. Construct a frequency distribution of the scores. Include within it a cumulative frequency column and also a cumulative percentage column. Also obtain the mean, median, and mode.

85	95	72	30
61	42	41	88
114	91	96	51
94	62	72	69
76	128	38	107
51	77	63	72
63	110	50	57
116	83	70	64
40	49	85	75
81	75	97	57
23	48	98	67
58	108	45	103
82	77	82	94
79	50	94	55
96	65	69	80
68	93	70	73
73	87	53	44
93	69	61	78
74	27	152	89
69	86	56	25

3. Find the mean of the following number of clerks which 30 different firms employed: 63, 70, 55, 58, 67, 60, 92, 44, 63, 75, 82, 54, 69, 78, 81, 85, 33, 76, 64, 48, 75, 57, 41, 98, 62, 73, 52, 66, 81, 65.

4. An elevator is designed to carry a maximum load of 3,500 pounds. If it is loaded with 20 passengers having a mean weight of 156 pounds, is there any danger that it might be overloaded?

5. Express the 1971 prices as a percentage of the 1961 prices of the following list of commodities in cents per pound.

	1961	1971
Round Steak	93 6	103 6
Chuck roast	61.6	59.4
Hamburger	56.6	51.2
Bacon, sliced	63.7	71 2
Lamb, leg	74.4	92 6
Rump steak	94.8	144 3

6. The following are the number of employees in different occupations within a firm. Calculate the range, mean, median, and mode: 39, 55, 46, 38, 41, 40, 33, 49, 42, 37, 49, 44, 51, 48, 44.

7. Each of 12 women taking part in a drive to raise money for an addition to the community hospital was assigned a certain quota, and the following are the percentages of their respective quotas which they actually collected: 94, 110, 80, 98, 95, 108, 101, 460, 75, 105, 110, 85. Calculate the median and the mean of these percentages, and indicate which of these measures is a better indication of the "average" performance of these 12 women. Why?

8. Find the mean and standard deviation for the following sets of figures.

   a. 23, 46, 33, 48, 12, 19, 33.
   b. 101, 108, 114, 146, 127, 132

Compare your written responses on the Self-Check with the Model Answers given below. Your responses should duplicate the model responses.

MODEL ANSWERS

1. a. You can determine how many bills amounted to less than $150.00 by adding up the frequencies in the classes below. You can do this because $150.00 begins a new class. Therefore, all the frequencies below it will be less than $150.00.

   b. No, you cannot determine how many of the bills amounted to $150.00 or less because you cannot determine how many bills were exactly $150.00. These would be included in the class which ranges from $150.00–$199.99. If you took the frequency from this class, you would be including bills which were above $150.00 and below $200.00

   c. No, you could not determine how many of the bills amounted to more than $200.00 because the frequency in the class $200.00–$249.99 also includes the bills which came to just $200.00, which are not **more than** $200.00

   d. Yes, you can determine how many bills amounted to $200.00 or more by adding up the frequencies in the class $200.00–$249.99 and the frequencies in the classes above it.

   e. No, you cannot determine how many of the bills amounted to $500.00 or more because the highest class includes $300.00 or more.

   f. You cannot really determine how many of the bills amounted to less than $175.00. However, as this is the midpoint of the class $150.00–$199.99, as a rough estimate you could halve the frequency of this class and add it to the frequencies of the classes below.

2. If you are going to obtain the median and mode you need to place the figures in ascending or decending order. Thus, we can rearrange the figures in the following way.

23	57	78	89
25	58	73	91
27	61	74	93
30	61	75	93
38	62	75	94
40	63	76	94
41	63	77	94
42	64	77	95
44	65	78	96
45	67	79	96
48	68	80	97
49	69	81	98
50	69	82	103
50	69	82	107
51	69	83	108
51	70	85	110
53	70	85	114
55	72	86	116
56	72	87	128
57	72	88	152

The median (the midmost point) falls between the 40th and 41st figure, which is 72.5.

The mode (the most frequently occurring figure) is 69. It occurs four times while any other figure occurs at the most only three times.

The mean (adding all the figures and dividing by 80) is.

$$5860 \div 80 = 73.25$$

If we select an interval of 10 for the frequency distribution, this will give us 14 groups. We can then construct the following table:

Weekly Wages	Frequency	Cumulative Frequency	Cumulative Percentage
20–29	3	3	3 75
30–39	2	5	6.25
40–49	7	12	15 00
50–59	10	22	27 50
60–69	13	35	43 75
70–79	15	50	62.50
80–89	11	61	76 25
90–99	11	72	90.00
100–109	3	75	93 75
110–119	3	78	97 50
120–129	1	79	98.75
130–139	0	79	98 75
140–149	0	79	98 75
150–159	1	80	100 00

Note that in the above you would probably report the last figure as 150 and above.

3. The total number of clerks employed is 1987. The mean is obtained by dividing this figure by

30, which gives 66.23. Obviously, it would be reported that the mean number of clerks employed is 66.

4. To find the total weight of people in the elevator, we multiply the mean weight of 156 pounds by the number of passengers, 20, which gives a total weight of 3120 pounds. This is well below the maximum load of 3,500 pounds, so the elevator is not overloaded.

5. To express the 1971 prices as a percentage of the 1961 prices, we place the 1971 prices over the 1961 prices as a fraction and multiply by 100. This gives the following percentages.

	1961	1971	Percentage
Round steak	93.6	103.6	110.68
Chuck roast	61.8	59.4	96.43
Hamburger	56.6	51.2	90.46
Bacon, sliced	63.7	71 2	111 77
Lamb, leg	74.4	92.6	124.46
Rump steak	94.8	144.3	152.22

6. The first thing we must do is place the figures in ascending or descending order.

   33, 37, 38, 39, 40, 41, 42, 44, 44, 46, 48, 49, 49, 51, 55

   The range is 33–55, which is a range of 22. The median is 44. There are two modes, 44 and 49. The mean is 656 divided by 15 which equals 43.73.

7. To obtain the median, we must first place the percentages in ascending or descending order. The figures then become:

   75, 80, 85, 94, 95, 98, 101, 105, 108, 110, 110, 460

   There being an even number of figures, the median will be the midpoint between the 6th and 7th figures—98 and 101—which is 99.5.

   The mean is the total divided by 12, which is 126.75. Obviously, the median is a better indication of average in this case because the mean is being distorted by the one very large figure—460.

8. a. To find the **standard deviation,** first take the scores and place them in a column and total them.

      Next to this column make another column of figures consisting of each of the scores squared.

      Total this column also. You will then have the following two columns and totals:

The Scores	The Scores Squared
12	144
19	361
23	529
33	1089
33	1089
46	2116
48	2304
214	7632

      Now take the total of the original scores and square it

$$= (214)^2 = 45796$$

      Divide this figure by the number of scores

$$= \frac{45796}{7} = 6542.28$$

      Now subtract this figure from the total of the **scores squared:**

$$= 7632 - 6542.28 = 1089.72$$

      Now divide this figure again by the number of scores:

$$= \frac{1089.72}{7} = 155.67$$

      Now take the square root of this figure:

$$= \sqrt{155.67} = \mathbf{12.48} = \textbf{the standard deviation}$$

      To find the **mean,** take the total of the scores and divide it by the number of scores.

$$= \frac{214}{7} = \mathbf{30.57} = \text{Mean}$$

   b. If you follow the above steps again for this set of figures, you will obtain a standard deviation of **15.27** and a mean of **121.33.**

LEVEL OF PERFORMANCE: Your completed Self-Check should have exactly duplicated the model responses. If any of your answers are incorrect, review the material in the information sheet, Analyzing Data from a Community Survey, pp. 14–23, or check with your resource person if necessary.

Learning Experience III

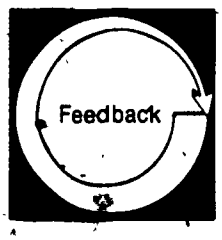
OVERVIEW

After completing the required reading, demonstrate ability to present community survey data using appropriate tables and graphs.

You will be reading the information sheet, Presenting Data Through Tables and Graphs, pp. 32–41.

You may wish to meet with a graphics teacher, or another person skilled in the graphic and pictorial presentation of information, to discuss in greater detail methods for presenting the data from a community survey.

You will be demonstrating ability to present community survey data using appropriate tables and graphs by completing the Self-Check, pp. 42–44.



You will be evaluating your competency by comparing your completed Self-Check with the Model Answers, pp. 45–47.

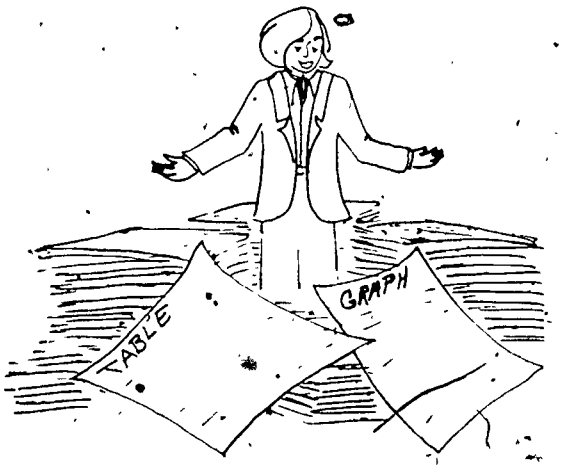
Activity

For information on the presentation of community survey data through the construction of appropriate tables and graphs, read the following information sheet:

PRESENTING DATA THROUGH TABLES AND GRAPHS

Tables

Once you have analyzed the data and drawn out from it all its significant facts, you then need to present these facts in the most clear, concise manner. In so doing, you must remember that those who will be reading and interpreting your report will not be familiar with the raw data and will not have your insights into the significance of the data. They were not involved in analyzing the data and, thus, will not have formulated a total picture of the facts. The challenge to you in presenting the results of your analysis is to convey its full meaning and significance without presenting so much detail as to confuse or bore your audience. The primary method of doing this is through constructing tables and graphs.



Captions for Tables

A statistical table is an array of figures, each one of which is interpreted by its particular row and column titles. The **rows** are the set of figures ranged **horizontally;** the **columns** are the set of figures ranged **vertically.** Thus, there are three sources of information in a table which explain each of the figures. These are (1) the title (or caption) of the table, (2) the heading for each column, and (3) the heading for each row. The value of the table, therefore, depends heavily on how well you have named the table, its columns, and rows.

Many tables, especially those containing such descriptive statistics as means and standard deviations, are captioned by first stating what the particular figures within it represent (e.g., numbers employed, salary levels, school dropouts) Then the information given in the rows is named, followed by the information in the columns. Suppose we constructed a table of figures displaying numbers employed in various occupations within different industries. If we head the rows by occupations and the columns by industries, we would caption the table, "Employment by Occupation and Industry." An example of such a table is shown in Sample 2.

Or, suppose we constructed a table displaying the average salary paid within various occupations and within different employing institutions. If we again headed the rows by occupational titles and the columns by different employing institutions, then we would caption the table by first stating what the particular figures are—average salaries ("mean salaries")—then stating what information is given in the rows, followed by what information is given in the columns. The table would, therefore, be captioned "Mean Salary Levels by Occupation and Employing Institution."

Construction of Tables

You will notice that the last row and column in the table give the totals of the respective rows and columns. The grand total is obtained by summing (adding) either of the total figures, from the total column or the total row. This is often an important piece of information to include in this way

Both the rows and column may be subdivided so as to include further significant information. For example, in the table we may have considered the employment figures within the different industries at two different times, say November 1973 and November 1977. We may also have wished to make the 1977 figure a percentage of the 1973 figure to indicate the degree to which employment has increased or decreased over time. To do this, we

SAMPLE 2

EMPLOYMENT BY OCCUPATION AND INDUSTRY WITHIN THE JONESVILLE AREA, NOVEMBER 1977

Occupations	Industries				
	Manufacturing Employment	Construction Employment	Wholesale Employment	Retail Employment	Total
Professional	426	34	28	22	510
Semi-professional	386	52	22	34	494
Managerial	350	43	31	38	462
Clerical	720	58	74	102	954
Sales	482	6	68	95	651
Skilled	927	126	49	83	1185
Semi-skilled	1217	248	96	127	1688
Unskilled	756	124	74	79	1033
Total	5264	691	442	580	6977

would subdivide each column into three to include the relevant figures. We would also indicate this additional information in the title of the table. So the table would look like the one shown in Sample 3.

If tables are to serve satisfactorily the purpose for which they are made, they not only must be accurately compiled but must be so arranged that they can be easily read and interpreted. The following points are helpful guides to achieving this goal.

- Ideally, a table should follow immediately after it is first mentioned in the text. However, if the table is a page or less in length, it is important to see that the table is presented in one piece. Therefore, you may need to continue your text to the end of the page and present your table at the top of the next page.
- Wide tables may be placed broadside on a page. The table number and heading of the table should be at the binding side of the page.
- Long tables may be continued from page to page. The table number and heading is typed at the beginning of the table, with only the table number on succeeding pages.
- In a long column of figures, zero preceding a decimal may be omitted from all entries except the first and last. Dollar signs, etc., must be repeated at the top of each column and after every break of the column. If all the figures are in thousands or in millions, space may be saved by omitting the relevant zeroes in the columns and noting this fact at the end of the heading of the table, for example, "Figures in Millions."
- Align all columns of figures by the decimal points. Abbreviations and symbols are legitimate space-saving devices in box headings and in the main body of tables, but not in the headings (or captions) of the tables.
- Put all footnotes to tables immediately below the tables, not at the foot of the page with footnotes to the text.
- Tables that have only two columns should be left completely unruled. In general, all tables of more than two columns should be ruled throughout. In a table continued from page to page, the bottom rule should be omitted on all pages except the last.

SAMPLE 3

COMPARATIVE EMPLOYMENT OVER TIME BY OCCUPATION AND INDUSTRY WITHIN THE JONESVILLE AREA, NOVEMBER 1973 AND NOVEMBER 1977

	Industries											
	Manufacturing Employment			Construction Employment			Wholesale Employment			Retail Employment		
Occupations	1973	1977	%	1973	1977	%	1973	1977	%	1973	1977	%
Professional	364	426	117	40	34	85	35	28	80	25	22	88
Semi-professional	351	386	110	59	52	88	20	22	110	39	34	87
Managerial	350	350	100	50	43	86	26	31	119	47	38	81
Clerical	632	720	114	57	58	102	68	74	109	105	102	97
Sales	402	482	120	6	6	100	54	68	126	98	95	97

Graphs

Graphs, and/or charts, are the shorthand of statistics. They are a most effective way of converting masses of data to a form that facilitates rapid comprehension and interpretation. Statistical information presented graphically has the great advantage over tables of being more easily understood and remembered than the same data in tabular form. This applies particularly to interrelated factors, which in the graph appear as part of an integrated whole, while in the table they appear as unconnected details.

There are five different types of graphs which you may use with good effect in reporting the results of a community survey. These are (1) curve graphs, (2) bar graphs, (3) column graphs, (4) circle graphs, and (5) pictographs. Each of these are very simple to construct but have different functions and relate to different types of statistical information. You need to know both how to construct them, and also which particular graph is most appropriate for the presentation of specific pieces of information.

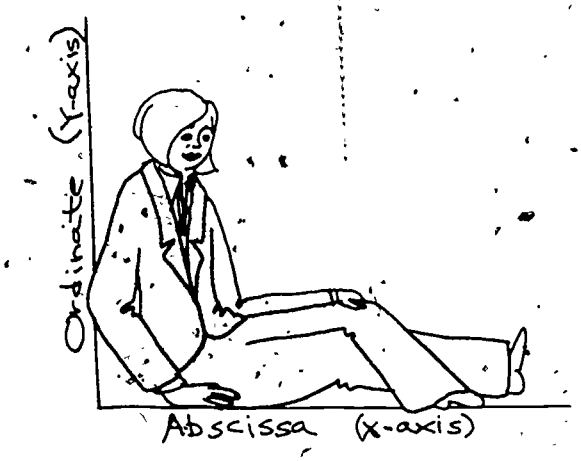
Curve Graphs

Curve graphs are sometimes called "line graphs" and are probably the most common form of graphic presentation. They are generally used for portraying trends, movements, and directions of change They are not as good as other types of graphs or charts for showing comparisons of size or amount Included within these graphs are those which portray information from frequency distributions called "frequency polygons," and those which portray information from cumulative frequency distributions. These are called "ogives."

Simply, the line graph consists of three elements. They are—

- a **horizontal line** (often called the **x-axis,** base line, or abscissa) on which one set of data are plotted from lowest to highest values moving right along the line
- a **vertical line** (often called the **y-axis,** or ordinate) meeting the left end of the base line and containing another set of related data plotted from the lowest to the highest values moving up the line
- a line or graph joining points together which have been determined by their relationship to the information on the x- and y-axes

If, for example, we wanted to display the change in hourly wage rates over time, the curve graph would be an ideal method of presentation Gener-



ally, we would plot the time information on the base line and the wage-rate information on the vertical axis. An example is shown in Sample 4

To draw a frequency polygon we do exactly the same as above. We plot the frequency on the y-axis and the other relevant information on the x-axis. This is the same procedure as for a cumulative frequency.

Remember that the shape of your graph is affected by the scale of numbers which you select for each axis. A good rule is to use up the graph space well without exaggerating the information on either of the axes. A rule of thumb which may be helpful in establishing a well-proportioned graph is to have the long side of the graph one and a half times the length of the short side. Then, choose a scale which will allow you to use up the whole of the graph space (often called the "grid.") Scales which show amounts (the y-axis on the curve graph in Sample 2) should generally be in even numbers or in multiples of five or ten.

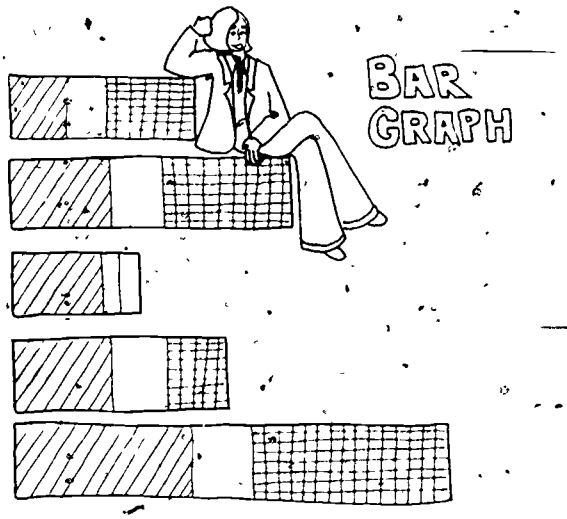
It is quite possible to plot more than one graph in the same space. This is an excellent way of showing comparisons. For example, we may have plotted the hourly wage rates of clerks over the same time. If this is done, each graph must be clearly labeled. It may help if one is drawn as a broken line and the other as an unbroken line.

Bar Graphs

The bar graph as used here refers to horizontal-bar graphs. It is one of the most frequently employed graphic presentations and has many advantages. It is readily understood, even by those unaccustomed to reading graphs. When the problem is one of comparing a large number of items, it is the only form that can be used effectively. It is also simple and easy to make.

One of the great advantages of the bar graph is that different portions of the bar can be shaded in different patterns to represent various components of the total information. Thus, not only do the two axes portray information, but so do the comparative lengths of the bars and the different shadings. Sample 5 shows an example of a typical bar graph. You will note how much more striking the visual comparisons in the bar graph are than in a table.

There are various modifications of the bar graph which you may choose according to the particular information you wish to convey, and in how much detail. For example, you may include the exact figures within each of the boxes rather than have a scale along the top. You may place the totals at the end of each bar. You may place the title for each bar within the bar to save space. Whatever the modifications, the principles of construction are the same. The bar graph is a striking visual portrayal of comparisons.

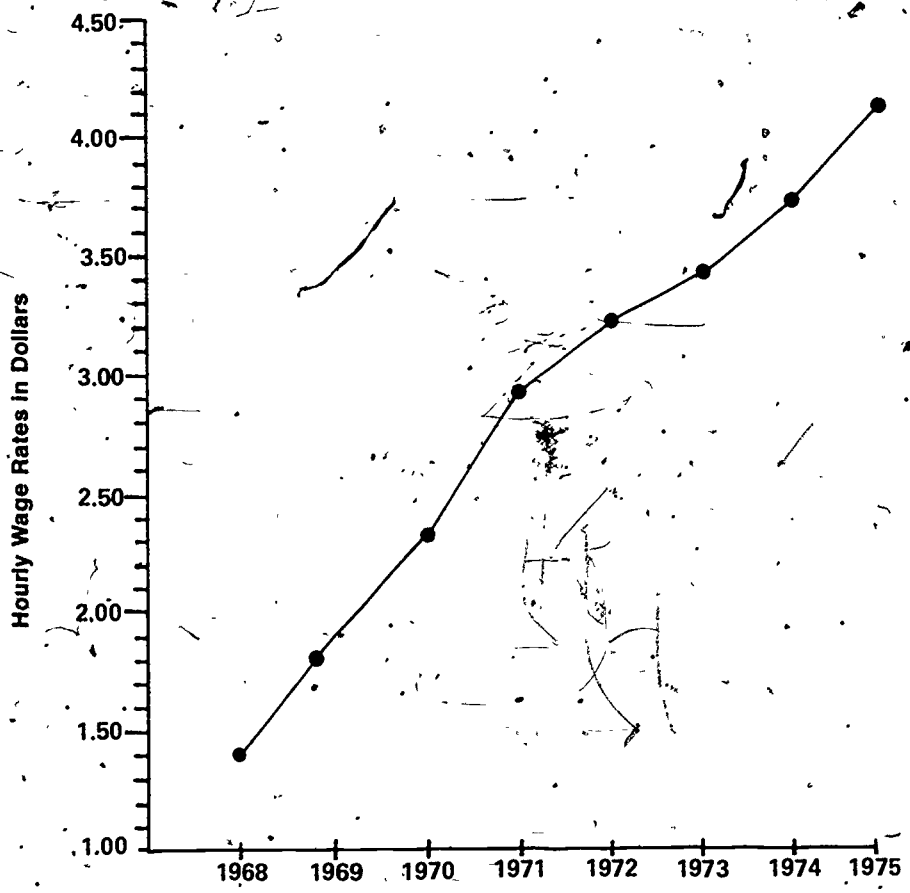


SAMPLE 4

CURVE GRAPH

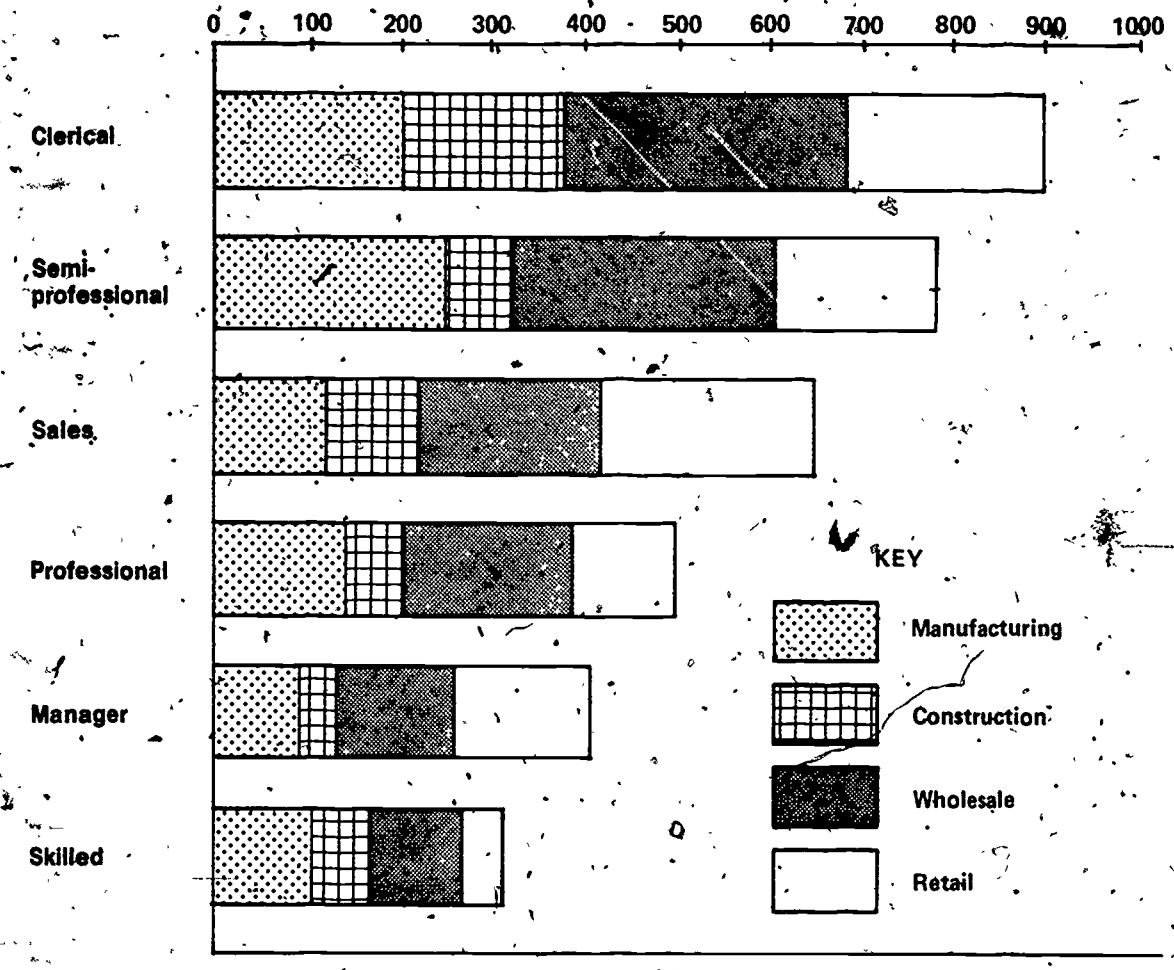
The following set of figures are the hourly wage rates for nurses from 1968 to 1975.

Wage Rate	Year
$1.40	1968
1.80	1969
2.30	1970
2.90	1971
3.20	1972
3.40	1973
3.70	1974
4.10	1975



SAMPLE 5

BAR GRAPH

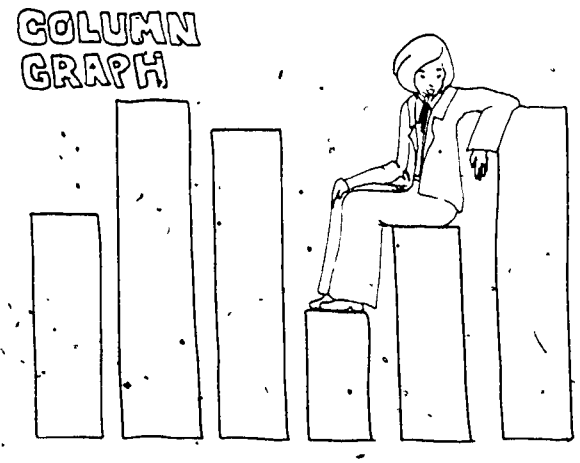


Employment by Occupation and Industry in Jonesville, November 1976.

Column Graphs

Column graphs are bar graphs arranged vertically. Their most frequent use is for picturing comparisons of similar components at **different** times. Bar graphs are generally employed to compare different components at the **same** time. The column design is particularly effective for the presentation of series which comprise a small number of time periods with few subdivisions of value.

The column graph is not well suited for comparisons of several time series nor for those which cover an extended period of time and have many plottings. They are more difficult to design than bar graphs because of the difficulty in labeling segmented columns.



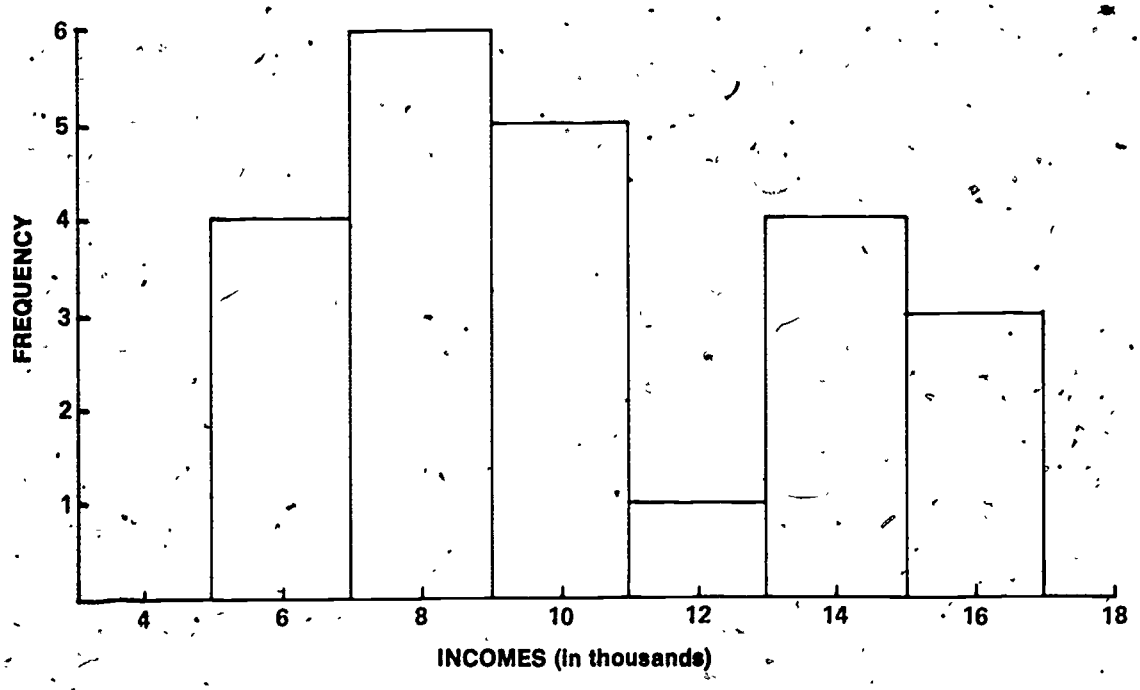
The most common column graph is called a "histogram." A histogram is a rectangular representation of the information given in a frequency table. You remember that in this table we grouped data together into intervals or classes, and recorded how many figures fell into each class—the frequency. In constructing a histogram, the groups or class sizes are recorded on the base line, and the numbers within the groups—the frequencies—are recorded on the vertical axis.

The graph, then, becomes a series of rectangles butting up against each other. It is constructed by drawing vertical lines from the lowest and highest values in the particular class (the class limits) to the relevant frequency level. To avoid a mass of figures on the base line, we often give only the midpoint of each class, as is shown in the example of a histogram in Sample 6 (constructed from the frequency table given on p. 17 of Learning Experience II).

A few points need to be watched in the construction of histograms. First, it must be remembered that this kind of graph cannot be used with **open** classes. (These are classes which state that a certain number of figures fall above or below a figure rather than within a boundary of two figures.) Secondly, it should be noted that the picture presented by a histogram can be very misleading if a distribution has unequal classes and no suitable adjustments are made.

SAMPLE 6

HISTOGRAM OF INCOMES



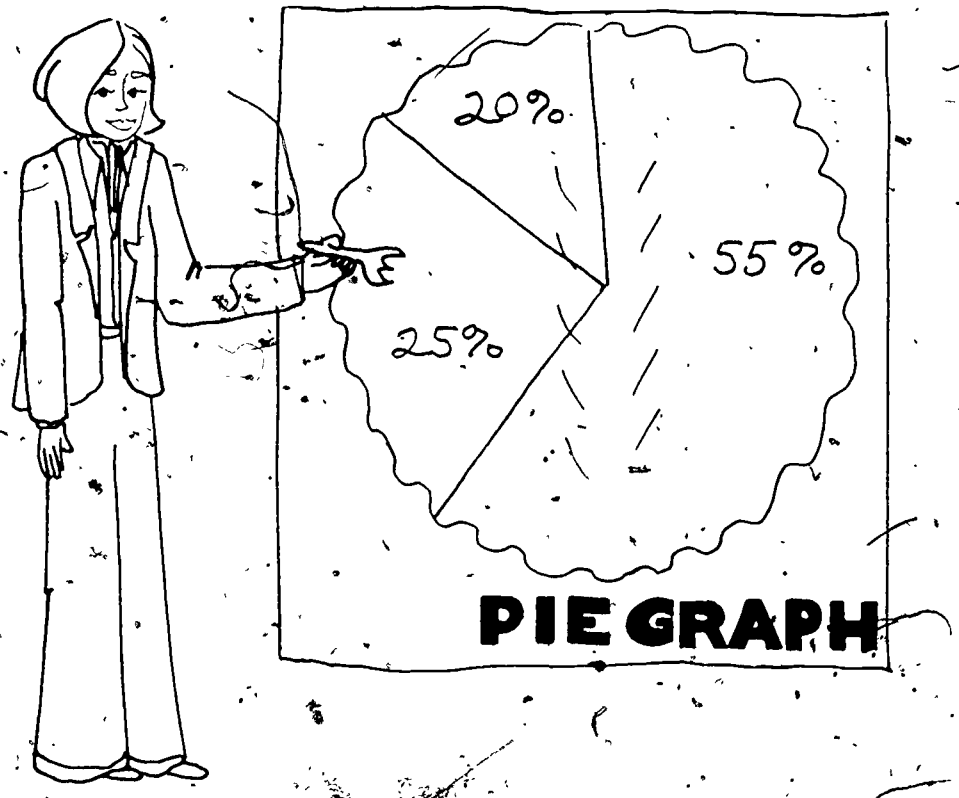
Circle Graphs

One use of circle graphs is in road maps to show the comparative sizes of cities While such a use may be quite effective, it is rather difficult to construct circles which have the right comparative sizes It is much easier to show comparisons by lines, bars or columns, and visually it is easier to see the comparative size relationship between two bars or two columns than between two circles

Perhaps the most common circle graph, and the most effective, is what is called a "pie" graph (or chart) This is a circle which is divided into segments to represent different components of the whole It is quite effective when the comparisons are gross and few in number However, it is less effective than bar and column designs for accurate reading and interpretation, particularly if the series contains a considerable number of components, or if the difference between the components is slight

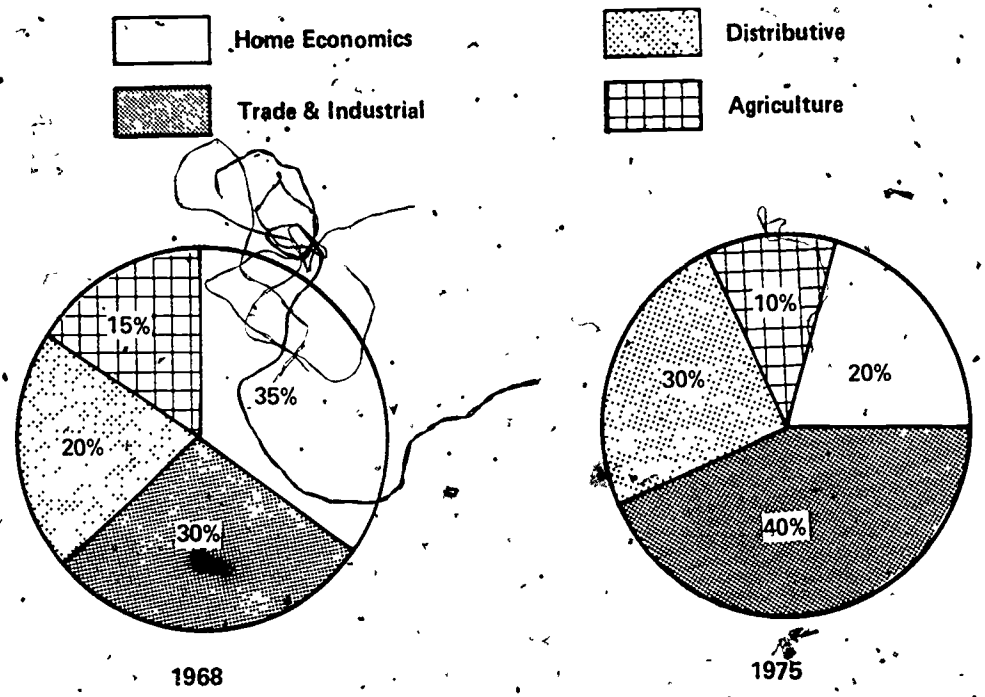
Pie graphs are probably most effectively used in displaying comparative percentages when the total circle represents one hundred percent Since there are 360 degrees in a circle, the percentage of the circle to be shown as a "cut of the pie" is equal to the percent of 360 Thus, 50 percent would be shown as 180 degrees, 25 percent as 90 degrees, 10 percent as 36 degrees, etc An example is shown in Sample 7

The general rule for constructing pie graphs is to begin at the vertical line from the center of the circle to the upper part representing 12 o clock and mark off to the right the largest sector. Then the arrangement of sectors is clockwise in order of size You will note that this is what was done in Sample 7 for the 1968 graph, the 1975 graph was then drawn in the same sequence as the 1968 graph so as to facilitate comparisons.



SAMPLE 7

PIE GRAPH



Students in vocational programs at Smithville High School

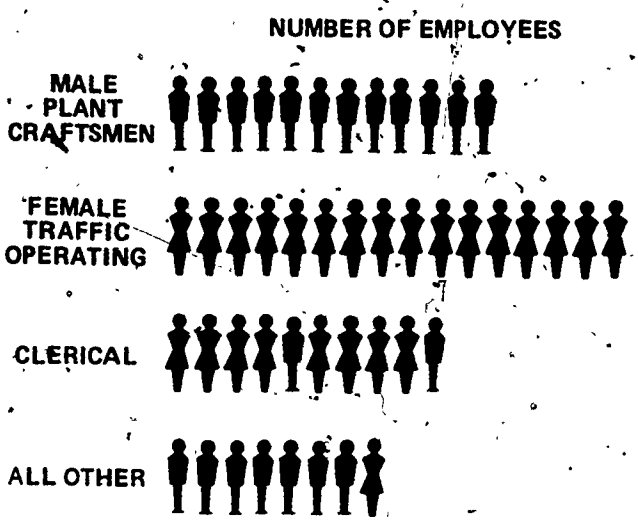
Pictograph

A pictograph (or pictoral graph) is the pictorial presentation of information by **figures** (pictures) and **symbols** which represent the material being displayed. Each quantity is indicated by the **number** of symbolic figures, rather than by the **size** of a single figure. These are well suited for illustrations in newspapers and magazines, for any type of audience requiring novelty in form of presentation, and for attracting attention and interest. The number of ways in which distributions (and other statistical data) can be displayed pictorially is almost unlimited. An example of a pictograph is given in Sample 8.

Whatever types of graphs you decide to use in your report, it is important that they be well drawn and attractive. The graphs must be constructed by using drawing instruments, not done freehand. A T-square, triangle, protractor, compass, and templates will be needed. If you are not competent in drawing, you may be able to obtain the help of a graphics teacher, graphic artist, or media specialist in your institution. If at all possible, the lettering on the graphs should be done by a typesetting machine or electric typewriter.

SAMPLE 8

PICTOGRAPH

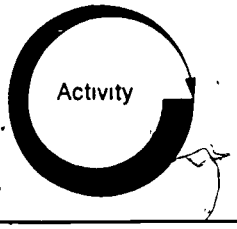


American Telephone and Telegraph Company

Typical distribution of employees in a large telephone company.

Optional Activity

You may wish to arrange through your resource person to meet with a graphics teacher, or another person skilled in the graphic and pictorial presentation of information, to discuss in greater detail the methods for presenting the data from a community survey.



The following items check your comprehension of the material in the information sheet, Presenting Data Through Tables and Graphs, pp. 32–41. Read the directions for each item carefully, and complete the exercises.

SELF-CHECK

1. Draw a **histogram** which suitably presents the data in the frequency table in item 2 on p. 25.

2. Draw a **bar graph** of the comparative prices given in item 5 on p. 26.

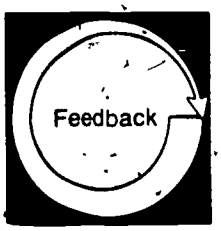
3. Draw a **pie graph** showing comparisons of the following percentages.

Occupation	Percentages	
	1968	1974
Professional	19	24
Semi-professional	25	30
Skilled	35	30
Unskilled	21	16

4. Draw a **curve graph** of the following information.

Distributive, and trade and industrial occupational employment as a percentage of total employment over time in the Smithville area.

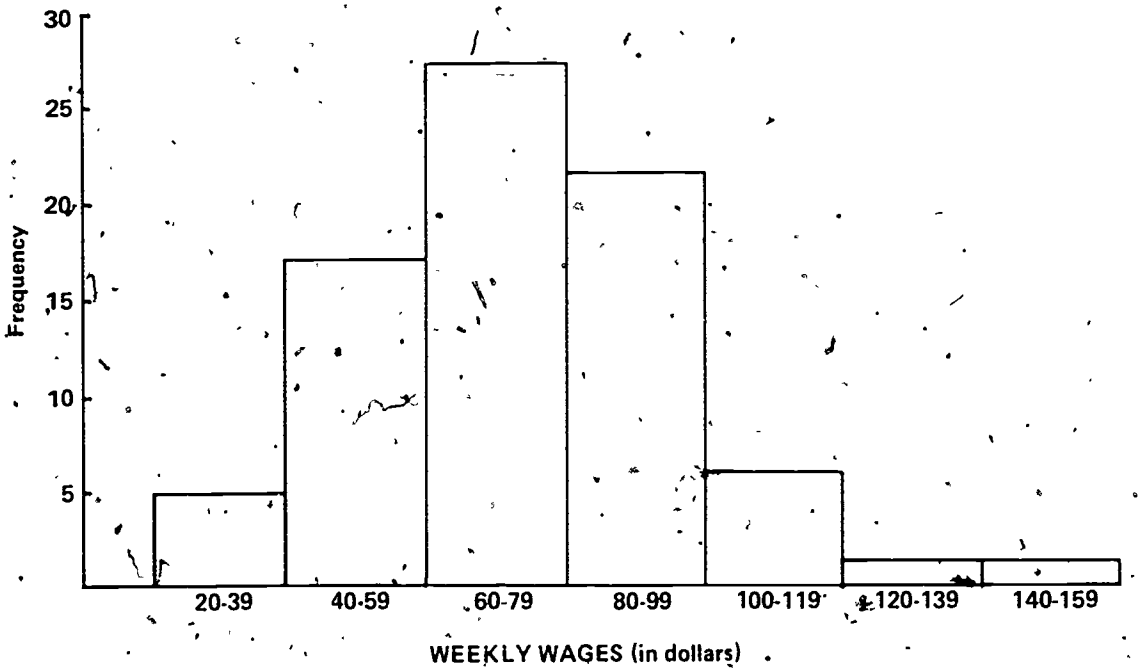
Occupation	Time				
	1968	1974	1975	1976	1977
Distributive	25	27	27	32	38
Trade and Industrial	38	42	44	43	39



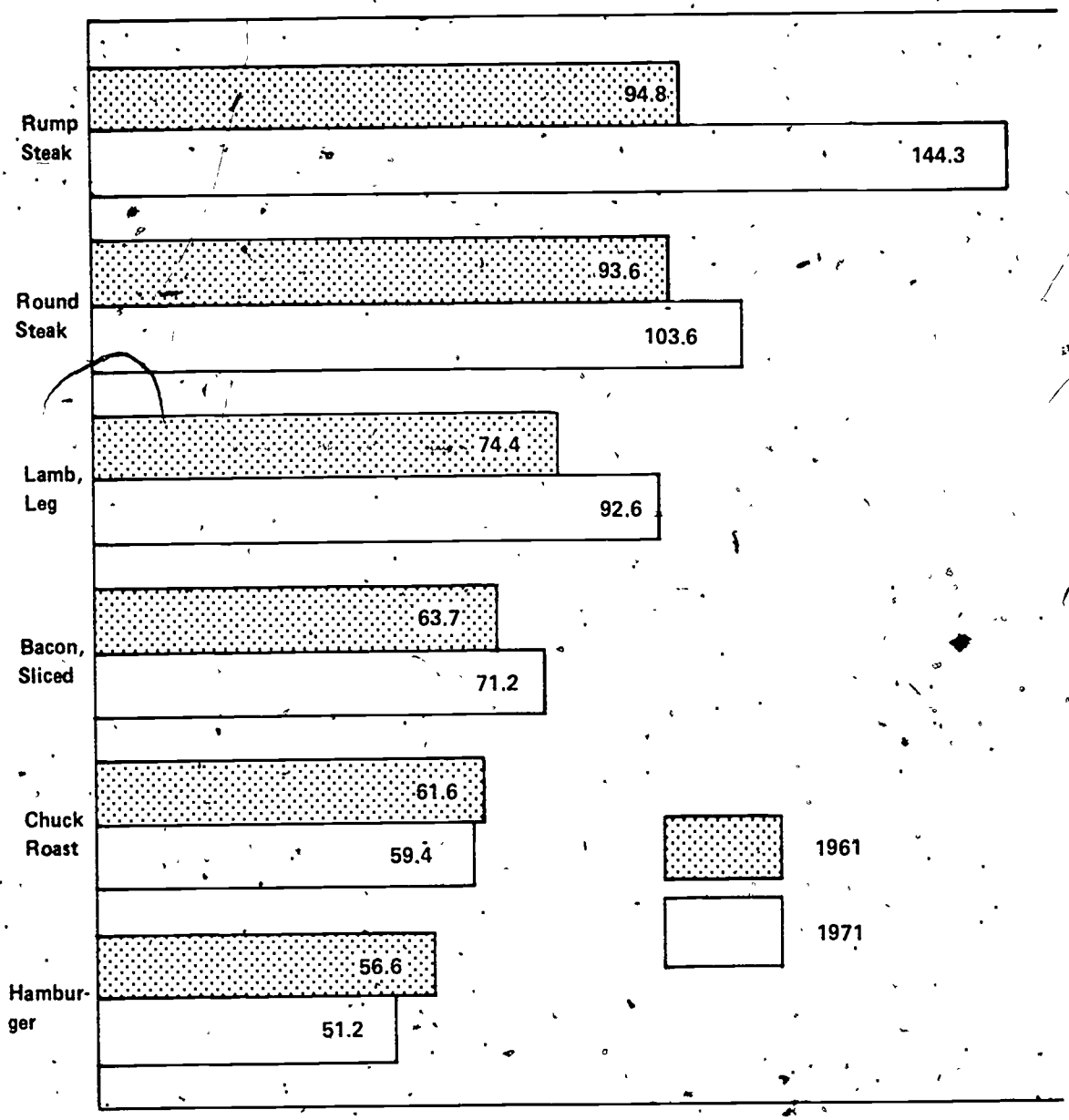
Compare your written responses on the Self-Check with the Model Answers given below. Your tables and graphs should closely match the model responses.

MODEL ANSWERS

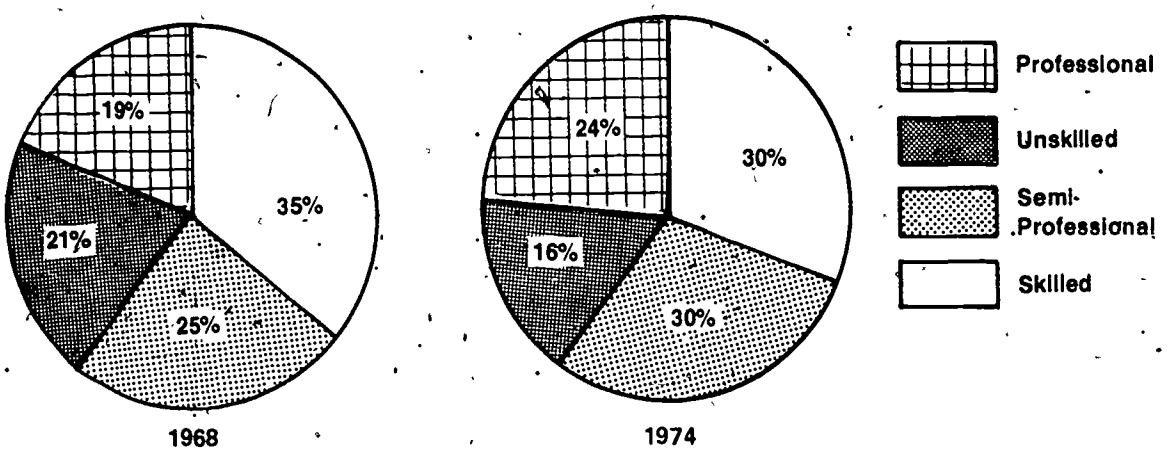
1. The number of groups given in the frequency table is probably too many to present well in a histogram. So we could combine the groups into pairs to reduce the number to half. In so doing, we add together the frequencies of each pair. The histogram would, therefore, look like the following.



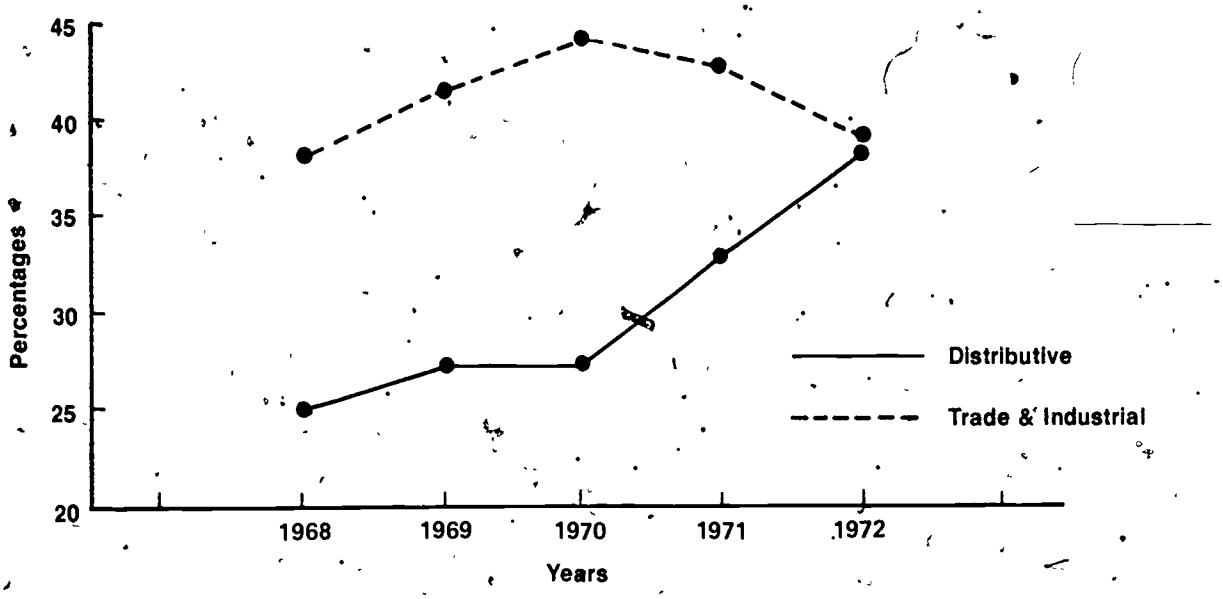
2. The most appropriate bar graph for the presentation of the comparative prices is a series of double comparative bars with the exact prices included within the bars rather than on the base line. The graph would look like the following.



3. Two pie graphs would need to be drawn for the appropriate comparisons. The 1968 figures would be used to determine the layout. These graphs would look like the following.



4. The appropriate graph would have the time on the base line, percentages on the y-axis, and two different graphs would be drawn to represent the Distributive and Trade and Industrial employment. This graph would look like the following.

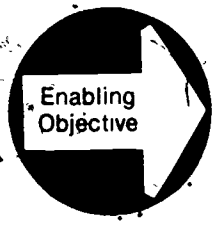


LEVEL OF PERFORMANCE: Your completed Self-Check should closely match the model responses. If any of your answers are incorrect, review the material in the information sheet, Presenting Data Through Tables and Graphs, pp. 32–41, or check with your resource person if necessary.

NOTES

Learning Experience IV

OVERVIEW



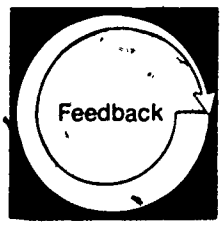
After completing the required reading, use the information provided in a given case situation to outline a report and a dissemination plan for a community survey.

You will be reading the information sheet, Reporting and Disseminating the Results of a Community Survey, pp. 50–53.

You may wish to read relevant sections of the supplementary reference, Turabian, *A Manual for Writers of Term Papers, Theses, and Dissertations.*

You may wish to meet with a teacher of English who is skilled in report writing to discuss in greater detail the characteristics of good report writing.

You will be reading the Case Situation, pp. 54–56, and outlining a report and dissemination plan for the community survey described in that situation.



Your competency in outlining a report on, and disseminating the results of, a community survey will be evaluated by your resource person, using the Checklist for Reporting on a Community Survey, pp. 57–58.

Activity

For information on writing a report on a community survey and disseminating the results, read the following information sheet:

REPORTING AND DISSEMINATING THE RESULTS OF A COMMUNITY SURVEY

Writing the Report

Once you have determined program recommendations based on your analysis of the data collected, your next step is to compile all this information into a formal written report. This report can then be used to communicate your findings and recommendations to the school administration and to the community.

The actual writing of the report is usually assigned to one or more persons who have superior writing skills. This may be you, a member of the survey team or the steering committee, a school administrator, or a combination of such persons. What is critical at this stage is that the report be completed and disseminated to key persons and groups in the community as quickly as possible to keep interest alive.

The first step in writing a report is to develop a suitable outline or format for organizing the report. The following outline is one which is frequently used in preparing these reports.

I. Abstract
II. Introduction to the Problem
  A. Need for the community survey
  B. Survey strategies
III. Findings from the Survey (Demographic Data)
IV. Conclusions
V. Recommendations
  A. New programs needed
  B. Changes needed in existing programs
  C. Personnel requirements
  D. Facilities needed
  E. Materials and equipment needed
  F. Costs

This outline is not the only acceptable one; changes and adaptations should be made so that the outline you use best fits your individual situation. The outline you finally devise or select should provide you with a procedure for presenting the survey information in a clear and interesting way. Special consideration should be given to determining the best method for presenting the **student interest data,** the **data on manpower needs,** and the **other relevant factors.** These three items need to be presented since they provide the major portion of the information used in the decision-making process.

In presenting this information, you should consider using a variety of methods: **tables, graphs, charts, diagrams,** and/or **narrative.** The methods of presentation that are finally selected should be those which most easily and clearly present the desired information.

The Abstract

An abstract is a **brief summary** of the total report. Although it will usually appear at the front of the report, it should be written last. Only after you have written the total report are you really in a position to identify the major points contained in the report. The abstract should be written in such a manner that if someone had time to read only the abstract, he or she would get an accurate picture of the **major findings** of the survey and the **major recommendations** which grew from the survey data.

The Introduction

The introduction should clearly point out **why** the community survey was needed, and **how** the resulting data was used. In addition, you need to explain the **methodology** that was followed in conducting the survey. If the explanation may be lengthy, it is recommended that you explain the survey design and sample selection process in a separate section of the report.

The Findings

All the data which was collected should be reported in the findings section so that each reader has the opportunity to evaluate and interpret the data firsthand. Research ethics require that all data be available so readers can manipulate or reorganize the data in a different manner should they choose to do so. This allows each reader the opportunity to arrive at different conclusions or recommendations.

Special care must be used to present the data in a meaningful and understandable form. Consequently, **tables, charts, graphs,** and **diagrams** are especially useful in this section. Much time and discussion should be spent ensuring that the data is accurately and clearly presented.

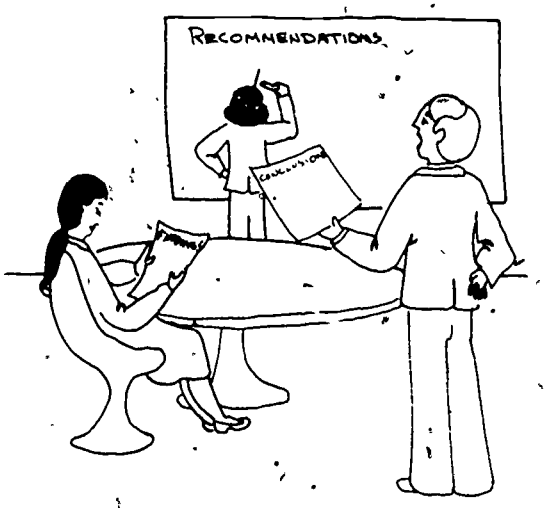
Conclusions

In this section, you need to report what **objective conclusions** can be drawn from the data. For example, assume the data indicates that students are interested in being trained as computer programmers, and that a local company is installing a computer and will need trained operators. You might then report the following statement in your conclusions section.

Although there is a need for computer operators in the community, and there is student interest in this field, there is presently no program for training in this area.

Recommendations

This is a more subjective section, although all recommendations should be based on objective data. In this section, you need to indicate what you and the persons assisting you think should be done on the basis of the findings and conclusions.



The recommendations section is undoubtedly the most important section of the report. After all, the purpose of conducting the community survey was to amass the data needed to make **recommendations for the improvement** of your vocational program. It is not sufficient merely to present the recommendations, however; great care must be taken to develop a **rationale** or reasonable basis for each recommendation.

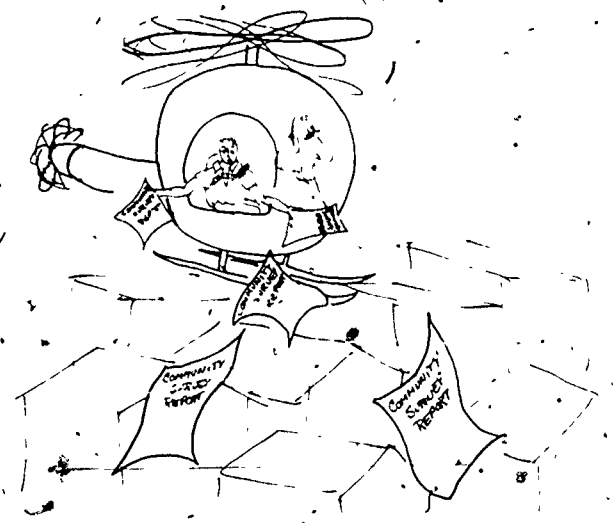
This is the section in which you need to discuss the **relationship** between the **conclusions** supported by the data and the **other relevant community factors.** For example, one of your conclusions was that a training program for computer programmers was needed. In the recommendations section, you might recommend one of the following actions depending on the nature of your community.

- The community's budget cannot cover the high cost of installing such a program at this time, but it is recommended that such a program be considered in the near future.
- Because the cost of installing such a program is so high, it is recommended that the program and the need for it be studied further before a decision is made.
- Although the need for such a program is not presently being filled, a nearby community college is gearing up to provide such a program. Thus, it is recommended that support be given to this program and students be made aware of its existence.

Finally, the recommendations section needs to tell the "whole story." It is not sufficient to recommend that "a program for the training of computer operators needs to be added to the vocational program." You need to go beyond that statement and describe what it means in terms of the **additional facilities, equipment, materials, personnel,** and **costs** involved in the change.

Disseminating the Results

To disseminate information means to spread the news to a wide audience. Once you have analyzed



the data and prepared the report, you need to determine how you will **communicate** your findings, conclusions, and recommendations to the school and community. This will involve contacting a number of different audiences.

The type of information you compile for each audience will depend on their interests and involvement in the ultimate decision-making. The **general public,** for example, needs to know the results of the survey, but wants to know what you've got to say **briefly and simply** without being hit with a lot of statistical data and research methodology.

On the other hand, you must be much more thorough when presenting your information to the **advisory committee, school board,** and **school administration.** These are the decision-makers, and they will want to make their decisions based on thorough research. Thus, they need to have access to the final report with **complete data** so they can determine if their analysis of the data results in the same conclusions and recommendations.

The first step in determining what information should be presented is to submit the report to the **administration** for approval and suggestions. Quite possibly, there are problems or concerns familiar only to the administration which would make it advisable to either emphasize or deemphasize certain conclusions and recommendations. Furthermore, all charts, graphs, and oral presentations covering the survey results should be approved by the school or district administration before you share this material with the news media or other audiences.

The next step is to determine **who** should get **what information** in **what order.** It would be unwise to release survey information to certain groups before it is released to other groups. For example, data should never be given to groups such as the chamber of commerce or the local employment service before they are released to the school board.

The final step is to determine what **strategy** should be used to convey the information to each group. You might wish to make a **presentation** to the advisory committee or P.T.A. You could send copies of the **report** to administrators or school board members You could arrange for an **interview** to be taped for a local radio station or for graphs and charts to be presented during a T.V. public affairs program The strategies selected should be those which are most likely to reach the intended audiences. The material should be presented in the most appropriate manner for the media being used.

It is helpful to form an **ad hoc advisory committee** for the purpose of publicizing the community survey results. This committee may consist of state department and/or university personnel, your school administrator, and other persons who assisted in planning and/or conducting the survey. By forming this committee you accomplish two important goals. You are beginning to **disseminate** the information to a select group, and you are getting **valuable advice** on how to disseminate the information from members of the groups that you need to reach.

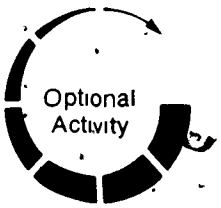
A list of some of the items you may wish to publicize follows.

- the number of people in your geographic area currently employed in specific occupations, the additional workers needed at present, and those needed in the next two to five years
- the jobs in greatest demand

- the jobs within an occupation for which additional training is needed
- past and present sources of manpower recruitment
- training requirements for present and projected job openings
- educational requirements for present and projected job openings
- occupational interests of students
- the relationship between the number of annual job openings and the number of students interested in preparing for these jobs
- existing vocational programs which should be modified or discontinued
- additional vocational programs which need to be established

If you carefully **analyze** the data, systematically prepare a written **report,** and conscientiously **disseminate** the resulting information to the appropriate audiences, the goal of your community survey should be reached—an improved vocational education program.

You may wish to read relevant sections of the supplementary reference, Turabian, *A Manual for Writers of Term Papers Theses, and Dissertations*, which covers, among other topics, rules for setting up tables and illustrations, footnote form, punctuation, etc.



You may wish to arrange through your resource person to meet with a teacher of English who is skilled in report writing to discuss in greater detail the characteristics of good report writing. During your visit, you might ask to look at examples of well-written and well-organized reports.

The following Case Situation is in two parts. Part I gives you background information on your case situation, and part II is partial data from a community survey conducted in your hypothetical community of Smithville.

Read parts I and II and then use the information given to write an **outline** of a comprehensive report on the community survey, and an **outline** of a dissemination plan for the survey results.

In the report outline, you need to indicate the type of information which would go into a complete report, and how it would be structured, with relevant examples drawn from the partial information supplied to you in part II. Specifically, you will need to include the following:

- a completed abstract for the report
- a brief statement of the problem
- a list of findings drawn from the information available to you from part II
- one appropriate graphic presentation to support or illustrate one of these findings
- a brief statement of your conclusions
- a list of recommendations drawn from the partial information supplied to you in part II

In your outline for the dissemination plan, include an explanation of how you will communicate your findings, and what groups will comprise your audience.

CASE SITUATION

I. Background Information:

You are a vocational teacher at Central High School in Smithville. You have just completed the data-gathering phase of a community survey you are conducting in Smithville. You are now ready to analyze the data, write a survey report, and disseminate the survey results. The data available to you follows. To assist you in interpretation of this data, the following facts need to be known about Smithville and your school.

Smithville is a community of 40,000 people. There are approximately 500 business establishments of all types in the community. Central High School serves the entire community. Fifteen hundred students are enrolled in the high school (grades 9–12), and there are 100 faculty members. The school has four guidance counselors. There are presently four vocational programs in the school (in the areas of agriculture, distributive education, home economics education, and trade and industrial education), each enrolling 40 students. Each of these programs has one full-time instructor.

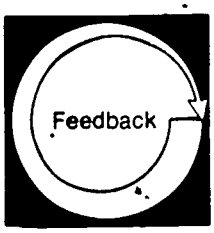
II. Occupational Data:

It is important to note that the data supplied here are only a **sample** of the type of data which you would obtain from a community survey. In a real situation, you would be handling much larger quantities of more diversified data.

COMMUNITY SURVEY DATA

Payroll Description	Persons Employed	Estimated Additional Jobs in Five Years	Average Job Replacement Per Year	New Jobs Added in Last Three Years	Expected Level of Education	
					Percent of High School Grad	Percent of Post-High School Training
Business Education Area						
Account Clerk	185	15	47	23	35	65
Payroll Clerk	53	9	12	5	20	80
General Clerk	569	13	153	21	81	19
Mail Clerk	47	7	67	−1	100	–
Computer Operator	5	1	–	5	–	100
Bookkeeping Machine Operator	56	5	10	4	75	25
Tabulating Machine Operator	169	18	39	23	95	5
Key Punch Operator	293	21	53	78	85	15
Calculating Machine Operator	50	5	11	8	95	5
Duplicating Machine Operator	56	7	12	6	95	5
File Clerk	156	11	14	12	80	20
Secretary	425	27	140	53	50	50
Stenographer	274	15	65	51	55	45
Typist	602	13	228	48	90	10
Telephone PBX/Receptionist	85	10	13	6	95	5
Agricultural Education Area						
Green House Florist	63	9	15	7	95	5
Nursery Worker	44	2	11	1	95	5
Greenskeeper	15	–	14	–	100	–
Parks and Residential Grounds Keeper	23	3	20	3	100	–
Farm Equipment Mechanic	165	21	32	12	75	25
Seed, Feed, and Fertilizer Salesperson	123	13	27	12	25	75
Home Economics Education Area						
Maid-Hotels, Etc.	152	29	123	8	100	–
Housekeeper	23	15	10	5	100	–
Cook	99	25	39	11	80	20
Waitress-Waiter	252	73	119	5	85	15
Meat Cutter	11	2	5	2	50	50
Child Care Attendant	51	150	33	25	65	35
Laundry Worker	61	7	36	2	100	–
Needle Trades Worker	97	32	15	12	75	25

Payroll Description	Persons Employed	Estimated Additional Jobs in Five Years	Average Job Replacement Per Year	New Jobs Added in Last Three Years	Expected Level of Education	
					Percent of High School Grad	Percent of Post-High School Training
Distributive Education Area						
Real Estate Agent	59	5	2	4	5	95
Financial Services Agent	101	12	3	7	25	75
Insurance Agent	153	15	15	9	20	80
General Salesperson	1,078	352	229	51	95	5
Hotel and Restaurant Worker	98	19	22	12	50	50
Transportation Worker	102	25	19	20	45	55
Advertising Agent	23	–	3	2	5	95
Utilities Worker	27	–	4	1	35	65
Health Related Education Area						
Dental Assistant	49	6	7	2	80	20
Dental Technologist	23	3	2	2	20	80
Practical Nurse	125	52	12	75	5	95
Registered Nurse	219	92	23	20	–	100
Nurse's Aide	101	107	42	63	75	25
Trade and Industrial Education Area						
Machinist	450	23	19	29	80	20
Miscellaneous Metal Trades Worker	820	105	45	152	100	–
Auto Mechanic	220	54	12	12	75	25
Diesel Mechanic	32	65	2	17	50	50
Auto Body Repairperson	79	72	18	19	75	25
Business Machines Repairperson	62	102	3	12	5	95
Small Appliance Repairperson	23	95	12	13	83	17
Radio, T.V Repairperson	33	35	3	19	20	80
Printing Machine Operator	12	2	1	–	80	20
Cabinetmaker	69	7	9	16	95	5
Brick Mason	107	19	12	4	95	5
Carpenter	152	27	22	31	95	5
Electrician	56	12	6	11	90	10
Plumber	25	3	4	1	90	10
Painter or Decorator	63	8	8	9	100	–
Arc Welder	53	23	15	23	90	10
Gas Welder	29	7	9	9	85	15
Truck Driver	124	21	65	12	100	–
Air Conditioning and Refrigeration Worker	31	150	12	15	20	80
Baker	29	2	1	–	50	50
Barber	12	4	–	2	5	95
Beauty Operator	39	9	7	12	50	50
Draftsman	52	12	12	2	5	95



After you have developed your outline of a report and dissemination plan for the community survey described, arrange to have your resource person review and evaluate your outline. Give him/her the Checklist for Reporting on a Community Survey, pp 57–58, to use in evaluating your work.

CHECKLIST FOR REPORTING ON A COMMUNITY SURVEY

Directions: Place an X in the NO, PARTIAL, or FULL box to indicate that each of the following performance components was not accomplished, partially accomplished, or fully accomplished. If, because of special circumstances, a performance component was not applicable, or impossible to execute, place an X in the N/A box.

Name _____

Date _____

Resource Person _____

	LEVEL OF PERFORMANCE			
	N/A	No	Partial	Full
The teacher's report included:				
1. a suitable format or outline	☐	☐	☐	☐
2. an abstract which pulls together important findings and recommendations	☐	☐	☐	☐
3. an abstract which is brief and to the point	☐	☐	☐	☐
4. an introduction which adequately points out the need for, and purposes of, the survey	☐	☐	☐	☐
5. a chart, graph, or table, etc., which presents some findings clearly and simply	☐	☐	☐	☐
6. conclusions supported by the data	☐	☐	☐	☐
7. recommendations supported by the data and the community factors	☐	☐	☐	☐
8. some rationale to support the recommendations	☐	☐	☐	☐
The teacher's dissemination plan included:				
9. provision for submitting material to be disseminated to the administration for approval	☐	☐	☐	☐
10. a list of the persons and groups that should get the information	☐	☐	☐	☐
11. the order in which these persons and groups should get the information	☐	☐	☐	☐
12. dissemination methods which were selected based on the audience to be reached and the type of media to be used	☐	☐	☐	☐
13. provision for seeking help and advice in disseminating the information	☐	☐	☐	☐
14. an outline of the procedure to be followed in presenting the findings to selected persons or groups	☐	☐	☐	☐

	N/A	No	Partial	Full
15. a description of the visual aids to be used in making presentations	☐	☐	☐	☐
16. a description of the conclusions and recommendations to be highlighted in the presentations	☐	☐	☐	☐
17. decisions which were based on the conclusions and recommendations in the written survey report	☐	☐	☐	☐

LEVEL OF PERFORMANCE: All items must receive FULL, or N. A responses. If any item receives a NO, or PARTIAL response, review the material in the information sheet, Reporting and Disseminating the Results of a Community Survey, pp. 50–53, revise your outlines accordingly, or check with your resource person if necessary.

Learning Experience V

FINAL EXPERIENCE

While working in an **actual school situation,*** report the findings of a community survey.

At a time when community survey data has been gathered, report or assist in reporting the findings of a community survey. This will include—

- organizing your data in preparation for analysis
- analyzing your community survey data
- preparing a written survey report
- disseminating the survey results to selected individuals and groups according to a dissemination plan

NOTE: Due to the nature of this experience, you will need to have access to an actual school situation over an extended period of time (e.g., four to six weeks).

As you complete each of the above activities, document your actions (in writing, on tape, through a log) for assessment purposes.

Arrange to have your resource person review your documentation, the written survey report, and the dissemination plan.

Your total competency will be assessed by your resource person, using the Teacher Performance Assessment Form, pp. 61–62.

Based upon the criteria specified in this assessment instrument, your resource person will determine whether you are competent in reporting the findings of a community survey.

*For a definition of actual school situation see the inside back cover

NOTES

TEACHER PERFORMANCE ASSESSMENT FORM

Report the Findings of a Community Survey (A–3)

Name _____

Date _____

Resource Person _____

Directions: Indicate the level of the teacher's accomplishment by placing an X in the appropriate box under the LEVEL OF PERFORMANCE heading. If, because of special circumstances, a performance component was not applicable, or impossible to execute, place an X in the N/A box.

	LEVEL OF PERFORMANCE					
	N/A	None	Poor	Fair	Good	Excellent
In organizing and analyzing the data from the survey, the teacher:						
1. determined the number of additional workers needed in specific occupations for future target dates	☐	☐	☐	☐	☐	☐
2. determined student interests and student occupational choices for his/her school district	☐	☐	☐	☐	☐	☐
3. determined specific occupations for which training is needed, based on manpower needs data and student interest data	☐	☐	☐	☐	☐	☐
4. decided which manpower needs and student interest needs are already being adequately met with existing vocational education programs	☐	☐	☐	☐	☐	☐
5. in conjunction with advisory committees, state vocational department personnel, university vocational education personnel, the chamber of commerce, the employment service, and other important persons, considered the relevant social, economic, political, and educational factors	☐	☐	☐	☐	☐	☐
6. synthesized all the community survey data and identified vocational education needs for his/her community or service area or both	☐	☐	☐	☐	☐	☐
The community survey report:						
7. was based on the analysis of the survey data	☐	☐	☐	☐	☐	☐
8. included a brief, concise abstract, highlighting the important conclusions and recommendations	☐	☐	☐	☐	☐	☐
9. included an introduction which adequately pointed out the need for the survey and what was to have been accomplished by the survey	☐	☐	☐	☐	☐	☐
10. adequately explained the methodology used in conducting the survey	☐	☐	☐	☐	☐	☐

	N/A	None	Poor	Fair	Good	Excelle
11. included charts, graphs, and tables to present the findings in an easily understood manner	☐	☐	☐	☐	☐	☐
12. drew conclusions which were supported by the data	☐	☐	☐	☐	☐	☐
13. recommended vocational program additions, deletions, and changes based on the available data	☐	☐	☐	☐	☐	☐
14. presented a logical rationale that supported each of the recommendations	☐	☐	☐	☐	☐	☐
15. was logically organized to present the information	☐	☐	☐	☐	☐	☐
16 was accurately and carefully written	☐	☐	☐	☐	☐	☐
17 was attractive and professional in appearance	☐	☐	☐	☐	☐	☐
In disseminating the results of the survey, the teacher:						
18. consulted with advisory committees, state and/or university personnel, and other key personnel in recommending program additions and changes	☐	☐	☐	☐	☐	☐
19. obtained approval from the school administration for publicizing the results	☐	☐	☐	☐	☐	☐
20. distributed copies of the survey report to key people within the school and community	☐	☐	☐	☐	☐	☐
21 publicized highlights of the vocational education survey in the community	☐	☐	☐	☐	☐	☐
22. made use of several methods for disseminating the survey information	☐	☐	☐	☐	☐	☐
23. made presentations to the administration and key community groups outlining the proposed vocational education program	☐	☐	☐	☐	☐	☐
24. selected for presentation those conclusions and recommendations that would be of major interest and concern to the various audiences	☐	☐	☐	☐	☐	☐
25. utilized visual aids in making presentations of the conclusions and recommendations	☐	☐	☐	☐	☐	☐

LEVEL OF PERFORMANCE: All items must receive N/A, GOOD, or EXCELLENT responses If any item receives a NONE, POOR, or FAIR response, the teacher and resource person should meet to determine what additional activities the teacher needs to complete in order to reach competency in the weak area(s).

NOTES

NOTES

ABOUT USING THE CENTER'S PBTE MODULES

Organization

Each module is designed to help you gain competency in a particular skill area considered important to teaching success. A module is made up of a series of learning experiences, some providing background information, some providing practice experiences, and others combining these two functions. Completing these experiences should **enable** you to achieve the **terminal** objective in the final learning experience The final experience in each module always requires you to demonstrate the skill in an actual school situation when you are an intern, a student teacher, or an inservice teacher.

Procedures

Modules are designed to allow you to individualize your teacher education program. You need to take only those modules covering skills which you do not already possess. Similarly, you need not complete any learning experience within a module if you already have the skill needed to complete it. Therefore, before taking any module, you should carefully review (1) the Introduction, (2) the Objectives listed on p 4, (3) the Overviews preceding each learning experience, and (4) the Final Experience. After comparing your present needs and competencies with the information you have read in these sections, you should be ready to make one of the following decisions:

- that you do not have the competencies indicated, and should complete the entire module
- that you are competent in one or more of the enabling objectives leading to the final learning experience, and thus can omit that (those) learning experience(s)
- that you are already competent in this area, and ready to complete the final learning experience in order to "test out"
- that the module is inappropriate to your needs at this time

When you are ready to take the final learning experience **and** have access to an actual school situation, make the necessary arrangements with your resource person. If you do not complete the final experience successfully, meet with your resource person and arrange (1) to repeat the experience, or (2) complete (or review) previous sections of the module or other related activities suggested by your resource person before attempting to repeat the final experience.

Options for recycling are also available in each of the learning experiences preceding the final experience Any time you do not meet the minimum level of performance required to meet an objective, you and your resource person may meet to select activities to help you reach competency. This could involve (1) completing parts of the module previously skipped; (2) repeating activities; (3) reading supplementary resources or completing additional activities suggested by the resource person; (4) designing your own learning experience, or (5) completing some other activity suggested by you or your resource person.

Terminology

Actual School Situation . . . refers to a situation in which you are actually working with, and responsible for, secondary or post-secondary vocational students in a real school. An intern, a student teacher, or an inservice teacher would be functioning in an actual school situation. If you do **not** have access to an actual school situation when you are taking the module, you can complete the module **up to** the final learning experience. You would then do the final learning experience later, i.e., when you have access to an actual school situation.

Alternate Activity or Feedback . . . refers to an item or feedback device which may **substitute** for required items which, due to special circumstances, you are unable to complete.

Occupational Specialty . refers to a specific area of preparation within a vocational service area (e g . the service area Trade and Industrial Education includes occupational specialties such as automobile mechanics, welding, and electricity)

Optional Activity or Feedback . refers to an item which is not required, but which is designed to **supplement** and enrich the required items in a learning experience.

Resource Person . . . refers to the person in charge of your educational program, the professor, instructor, administrator, supervisor, or cooperating/supervising/classroom teacher who is guiding you in taking this module.

Student . . refers to the person who is enrolled and receiving instruction in a secondary or post-secondary educational institution.

Vocational Service Area . . refers to a major vocational field agricultural education, business and office education, distributive education, health occupations education, home economics education, industrial arts education, technical education, or trade and industrial education.

You or the Teacher refers to the person who is taking the module.

Levels of Performance for Final Assessment

N/A . . . The criterion was not met because it was **not applicable** to the situation

None . . . **No attempt** was made to meet the criterion, although it was relevant.

Poor . . . The teacher is unable to perform this skill or has only **very limited ability** to perform it

Fair . . . The teacher is unable to perform this skill in an acceptable manner, but has **some ability** to perform it.

Good . . . The teacher is able to perform this skill in an **effective** manner.

Excellent . . The teacher is able to perform this skill in a **very effective** manner.

Titles of The Center's Performance-Based Teacher Education Modules

Category A: Program Planning, Development, and Evaluation

- A-1 Prepare for a Community Survey
- A-2 Conduct a Community Survey
- A-3 Report the Findings of a Community Survey
- A-4 Organize an Occupational Advisory Committee
- A-5 Maintain an Occupational Advisory Committee
- A-6 Develop Program Goals and Objectives
- A-7 Conduct an Occupational Analysis
- A-8 Develop a Course of Study
- A-9 Develop Long-Range Program Plans
- A-10 Conduct a Student Follow-Up Study
- A-11 Evaluate Your Vocational Program

Category B: Instructional Planning

- B-1 Determine Needs and Interests of Students
- B-2 Develop Student Performance Objectives
- B-3 Develop a Unit of Instruction
- B-4 Develop a Lesson Plan
- B-5 Select Student Instructional Materials
- B-6 Prepare Teacher-Made Instructional Materials

Category C: Instructional Execution

- C-1 Direct Field Trips
- C-2 Conduct Group Discussions, Panel Discussions, and Symposiums
- C-3 Employ Brainstorming, Buzz Group, and Question Box Techniques
- C-4 Direct Students in Instructing Other Students
- C-5 Employ Simulation Techniques
- C-6 Guide Student Study
- C-7 Direct Student Laboratory Experience
- C-8 Direct Students in Applying Problem-Solving Techniques
- C-9 Employ the Project Method
- C-10 Introduce a Lesson
- C-11 Summarize a Lesson
- C-12 Employ Oral Questioning Techniques
- C-13 Employ Reinforcement Techniques
- C-14 Provide Instruction for Slower and More Capable Learners
- C-15 Present an Illustrated Talk
- C-16 Demonstrate a Manipulative Skill
- C-17 Demonstrate a Concept or Principle
- C-18 Individualize Instruction
- C-19 Employ the Team Teaching Approach
- C-20 Use Subject Matter Experts to Present Information
- C-21 Prepare Bulletin Boards and Exhibits
- C-22 Present Information with Models, Real Objects, and Flannel Boards
- C-23 Present Information with Overhead and Opaque Materials
- C-24 Present Information with Filmstrips and Slides
- C-25 Present Information with Films
- C-26 Present Information with Audio Recordings
- C-27 Present Information with Televised and Videotaped Materials
- C-28 Employ Programmed Instruction
- C-29 Present Information with the Chalkboard and Flip Chart

Category D: Instructional Evaluation

- D-1 Establish Student Performance Criteria
- D-2 Assess Student Performance: Knowledge
- D-3 Assess Student Performance: Attitudes
- D-4 Assess Student Performance: Skills
- D-5 Determine Student Grades
- D-6 Evaluate Your Instructional Effectiveness

Category E: Instructional Management

- E-1 Project Instructional Resource Needs
- E-2 Manage Your Budgeting and Reporting Responsibilities
- E-3 Arrange for Improvement of Your Vocational Facilities
- E-4 Maintain a Filing System
- E-5 Provide for Student Safety
- E-6 Provide for the First Aid Needs of Students
- E-7 Assist Students in Developing Self-Discipline
- E-8 Organize the Vocational Laboratory
- E-9 Manage the Vocational Laboratory

Category F: Guidance

- F-1 Gather Student Data Using Formal Data-Collection Techniques
- F-2 Gather Student Data Through Personal Contacts
- F-3 Use Conferences to Help Meet Student Needs
- F-4 Provide Information on Educational and Career Opportunities
- F-5 Assist Students in Applying for Employment or Further Education

Category G: School-Community Relations

- G-1 Develop a School-Community Relations Plan for Your Vocational Program
- G-2 Give Presentations to Promote Your Vocational Program
- G-3 Develop Brochures to Promote Your Vocational Program
- G-4 Prepare Displays to Promote Your Vocational Program
- G-5 Prepare News Releases and Articles Concerning Your Vocational Program
- G-6 Arrange for Television and Radio Presentations Concerning Your Vocational Program
- G-7 Conduct an Open House
- G-8 Work with Members of the Community
- G-9 Work with State and Local Educators
- G-10 Obtain Feedback about Your Vocational Program

Category H: Student Vocational Organization

- H-1 Develop a Personal Philosophy Concerning Student Vocational Organizations
- H-2 Establish a Student Vocational Organization
- H-3 Prepare Student Vocational Organization Members for Leadership Roles
- H-4 Assist Student Vocational Organization Members in Developing and Financing a Yearly Program of Activities
- H-5 Supervise Activities of the Student Vocational Organization
- H-6 Guide Participation in Student Vocational Organization Contests

Category I: Professional Role and Development

- I-1 Keep Up-to-Date Professionally
- I-2 Serve Your Teaching Profession
- I-3 Develop an Active Personal Philosophy of Education
- I-4 Serve the School and Community
- I-5 Obtain a Suitable Teaching Position
- I-6 Provide Laboratory Experiences for Prospective Teachers
- I-7 Plan the Student Teaching Experience
- I-8 Supervise Student Teachers

Category J: Coordination of Cooperative Education

- J-1 Establish Guidelines for Your Cooperative Vocational Program
- J-2 Manage the Attendance, Transfers, and Terminations of Co-Op Students
- J-3 Enroll Students in Your Co-Op Program
- J-4 Secure Training Stations for Your Co-Op Program
- J-5 Place Co-Op Students on the Job
- J-6 Develop the Training Ability of On-the-Job Instructors
- J-7 Coordinate On-the-Job Instruction
- J-8 Evaluate Co-Op Students' On-the-Job Performance
- J-9 Prepare for Students' Related Instruction
- J-10 Supervise an Employer-Employee Appreciation Event

RELATED PUBLICATIONS

- Student Guide to Using Performance-Based Teacher Education Materials
- Resource Person Guide to Using Performance-Based Teacher Education Materials
- Guide to the Implementation of Performance-Based Teacher Education

For information regarding availability and prices of these materials contact—

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