

AN ANALYSIS OF COMPETENCIES NEEDED BY INTRODUCTORY  
DATA PROCESSING TEACHERS AS PERCEIVED BY  
AUTHORITIES AND TEACHERS OF  
DATA PROCESSING

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A Dissertation

Presented to  
the Faculty of the Graduate School  
University of Houston

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In Partial Fulfillment  
of the Requirements for the Degree  
Doctor of Education

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by  
Nora Jo Martin Sherman

August 1975

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N.J.M.S.

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## ABSTRACT

Sherman, Nora Jo Martin. An Analysis of Competencies Needed by Introductory Data Processing Teachers as Perceived by Authorities and Teachers of Data Processing. Unpublished doctoral dissertation. University of Houston, August 1975.

This study was designed to compile a rank-ordered list of competencies which introductory data processing teachers should possess and to analyze these competencies as perceived by data processing teachers and authorities in the field of business data processing.

The list of competencies used in the initial questionnaire was developed through a review of related literature and from observations of practicing data processing teachers at the high school and junior college level.

The population consisted of American and Canadian business data processing authorities and Texas high school and junior college teachers of introductory data processing.

A three-questionnaire modification of the Delphi technique was used as a tool for gathering, organizing, and sharing opinions of the participants in the study. Participants were asked to rate, revise, and expand upon the first questionnaire which contained a partial list of competencies. In Questionnaire II, participants

were asked to rate the revised and expanded list of competencies. The third questionnaire was identical to Questionnaire II except that a black square had been drawn around the rating reflecting the modal consensus and the respondent's rating had been encircled in red. Participants were asked to review their responses in relation to those of the modal consensus and either join the modal consensus or state briefly why they chose to remain outside the modal consensus.

Using the chi-square, significance was determined at the .05 level of confidence on the responses of the three groups to the competency statements.

Based on the findings of this study, three lists of competencies were developed. One list of competencies was rated crucial and highly desirable by business data processing authorities and Texas junior college teachers. The second list of competencies was rated crucial and highly desirable by both business data processing authorities and Texas high school teachers. The third list of competencies was rated crucial and highly desirable by a modal consensus of high school and junior college introductory data processing teachers. Also included in the lists were competencies which received a crucial or highly desirable rating by 50 percent or more of the respondents from either of the groups, but which were outside the modal consensus.

## AUTHORITIES AND JUNIOR COLLEGE TEACHERS

Those competencies rated crucial by modal consensus of authorities and junior college teachers are shown here. Reference, by number, is made here to those competencies ranked highly desirable by modal consensus of both groups. A complete listing of competencies receiving varying ratings by the two groups is given in Appendix M, page 212.

Planning: "Knowledge of the end results--what the student is expected to accomplish by the completion of the course." Eighteen competencies were rated highly desirable.

Administration: Four competencies were rated highly desirable.

Instruction--Content: "Knowledge of data processing terminology," "Knowledge and application of data processing functions," "Knowledge of the electronic computer," and "Ability to flow chart." Twelve competencies were ranked highly desirable.

Instruction--Methodologies/Techniques: "Ability to demonstrate flow charting," and "Ability to demonstrate the computer." Nine competencies were rated highly desirable.

Communication: "Provision for teacher-pupil interaction," and "Ability to explain verbally." One competency was rated highly desirable.

Evaluation: Six competencies were rated highly desirable.

Developing Pupil-Self: "Development of ability to follow instructions." Four competencies were rated highly desirable.

Personal Attributes: "Knowledge of the ethical procedures of a professional," and "Establishment of proper teacher behavior as an example to students." Two competencies were rated highly desirable.

## AUTHORITIES AND HIGH SCHOOL TEACHERS

Those competencies rated crucial by modal consensus of authorities and high school teachers are presented here. Reference, by number, is made here to those competencies rated highly desirable by modal consensus of the two groups. A complete listing of competencies receiving varying ratings by the two groups is given in Appendix N, page 223.

Planning: "Development of data processing concepts to be learned by the students," and "Knowledge of the end results--what the student is expected to accomplish by the completion of the course." Eighteen additional competencies were rated highly desirable.

Administration: "Provision for repair and maintenance of equipment if needed." Four competencies were rated highly desirable.

Instruction--Content: "Knowledge of data processing terminology," and "Knowledge and application of data processing functions." Eleven competencies were ranked highly desirable.

Instruction--Methodologies/Techniques: "Ability to demonstrate flow charting." Six competencies were rated highly desirable.

Communication: Two competencies were rated highly desirable by modal consensus.

Evaluation: Four competencies were rated highly desirable.

Developing Pupil-Self: "Stressing the need for regular attendance in the classroom." Six competencies were ranked highly desirable.

Personal Attributes: "Development of students' confidence by never violating their trust," and "Establishment of proper teacher behavior as an example to students." Two competencies were rated highly desirable.

## HIGH SCHOOL AND JUNIOR COLLEGE TEACHERS

Listed below are those competencies rated crucial by modal consensus of authorities and junior college teachers. Reference, by number, is made here to those competencies ranked highly desirable by modal consensus of both groups. A complete listing of competencies receiving varying ratings by the two groups is given in Appendix O, page 237.

Planning: "Knowledge of the end results--what the student is expected to accomplish by the completion of the course." Twenty-five competencies were considered highly desirable.

Administration: Five competencies were rated highly desirable.

Instruction--Content: "Knowledge of data processing terminology," and "Knowledge and application of data processing functions." Fifteen competencies were rated highly desirable.

Instruction--Methodologies/Techniques: "Ability to demonstrate the computer," and "Ability to demonstrate flow charting." Fourteen competencies were rated highly desirable.

Communication: Seven competencies were rated highly desirable by modal consensus.

Evaluation: Seven competencies were rated highly desirable.

Developing Pupil-Self: Nine competencies were ranked highly desirable.

Personal Attributes: "Establishment of proper teacher behavior as an example to students." Ten competencies were rated highly desirable.

The recommendation is made that the competencies rated crucial and highly desirable by the three groups be given immediate consideration in the planning and implementation of a competency-based teacher education program in business education.

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## Chapter 1

### INTRODUCTION

Data processing as a means of producing a desired answer or result through the manipulation of factual matter of all kinds has been a part of the business office since its inception. The term can be applied to recording, classifying, sorting, calculating, summarizing, communicating, and storing of information.<sup>1</sup> Changes in data processing have occurred through improved methods of handling data. The type-writer, teletype, telephone, and filing systems were all invented to expedite the processing of data.

The most recent and profound invention affecting data processing was the computer, which was first used in the business office in 1954.<sup>2</sup> Westley described early education in data processing as follows:

The subject matter was so new and strange to everyone that only the people who had created these

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<sup>1</sup>S. J. Wanous, E. E. Wanous, and Gerald E. Wagner, Fundamentals of Data Processing, (Cincinnati, Ohio: South-Western Publishing Co., 1971), p. 389.

<sup>2</sup>F. Kendrick Bangs, "The Teaching of Data Processing," National Business Education Association Yearbook, No. 10, (Washington, D. C.: National Business Education Association, 1971), p. 60.

new machines knew what knowledge and skills were necessary to make them work as desired.<sup>3</sup>

Manufacturers provided the education necessary as a courtesy to purchasers of the machines. Operators were recruited from the ranks of company employees with selection favoring those employees with backgrounds in mathematics.

As computer utilization increased, manufacturers cooperated with school districts in providing this new knowledge by furnishing expensive pieces of equipment at discounted prices. Early teachers were recruited from the ranks of individuals fortunate enough to have been involved with the processing of data using computers in business offices. Manufacturers still maintained an active involvement in data processing education through workshops and conferences designed to update users and teachers as changes were made in equipment.

The field grew rapidly. In 1971, 48,000 computers were at work in the United States, with projected increases to 85,000 computers in this country by 1975. Reports predicted direct involvement of more than 3,000,000 people in computer operation by 1975.<sup>4</sup>

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<sup>3</sup>John W. Westley, "Data Processing," National Business Education Association Yearbook, No. 10, (Washington, D. C.: National Business Education Association, 1972), p. 167-182.

<sup>4</sup>Wanous, op. cit.

Improvements in computers resulted in increasing machine speeds. This means that more data goes in and more data comes out; therefore, more clerical help is needed to handle the input and output work. A mathematics background is not necessarily needed in performing these routine clerical tasks. An overview or an introduction to the field of data processing would be an asset.

F. Kendrick Bangs recommended that an introductory data processing course be offered at both the high school and junior college level.<sup>5</sup>

Enrollment increases in Texas secondary school business data processing courses reflected an increasing demand for training in this area. Vital Statistics of the Business Education Program in Texas (see Appendix A, page 140) showed 248 pupils enrolled in business data processing courses in 1967-68. The 1973-74 statistics revealed 986 pupils enrolled in business data processing, or a 398 percent increase in seven years.

Education in data processing has evolved to a stage of development where adequate teacher training is needed to meet this demand for public education. What competencies should a teacher possess to effectively teach an introductory course in data processing?

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<sup>5</sup>Bangs, op. cit.

Development of observable teacher competencies is an innovative approach to education which could aid business education in meeting the challenge of the computer. Competency-Based Teacher Education (CBTE) places emphasis on objectives which are spelled out in advance. Students are told explicitly at the outset of a course what behaviors will be expected of them on exiting from the course. Time is not held as a constant. Achievement is held as a constant and time can vary. CBTE focuses on exiting requirements rather than on entrance requirements.<sup>6</sup> Competency-Based Teacher Education is a learner-oriented approach to teacher education.

#### Need for the Study

H. Del Schalock, et al, outlined the following four-part process needed to accomplish a CBTE program:<sup>7</sup>

1. Pupil outcomes desired.
2. Conditions that bring about the pupil outcomes desired.
3. Competencies needed by teachers to provide the conditions that bring about the pupil outcomes desired.

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<sup>6</sup>James M. Cooper and Wilford A. Weber, "A Competency-Based Systems Approach to Teacher Education," (Houston, Texas: University of Houston, College of Education, 1974), p. 14.

<sup>7</sup>H. Del Schalock, et al. (ed.) "A Plan for Managing the Development, Implementation and Operation of a Model Elementary Teacher Education Program" (Monmouth, Oregon: Oregon College of Education, 1970), p. 6. (Mimeographed.)

4. Conditions that lead to the knowledge, skill, and sensitivities teachers need to provide the conditions that bring about the pupil outcomes desired.

Item 3 of the Schalock process is of prime importance in implementing a Competency-Based Teacher Education program. In order to describe in advance what a teacher should be able to demonstrate, specific lists of competencies are needed.

## THE PROBLEM

### Statement of the Problem

A search of the literature revealed that a research base does not exist in the area of competencies needed for effective teaching of introductory data processing.

### Purpose of the Study

Therefore, the purpose of this study was to: (1) compile a rank-ordered list of competencies which introductory data processing teachers should possess, and (2) analyze these competencies for agreement or disagreement between the perceptions of Texas data processing teachers and American and Canadian authorities in the field of business data processing.

### Importance of the Study

Competency-Based Teacher Education programs have gained sufficient recognition and approval that seventeen states are now

basing their certification requirements on competencies.<sup>8</sup> This analysis of competencies needed by data processing teachers provides a research base for development of competency-based teacher education in the area of introductory data processing. It would also aid administrators in evaluation of existing programs. The list would further provide a sound basis upon which administrative decisions could be made regarding hiring of new teachers as well as evaluation of practicing teachers. Teachers of data processing could benefit from this list as a tool for self analysis to determine possible need for further professional training.

#### Limitations of the Study

The researcher placed the following limitations on the study:

1. This study did not attempt to establish behaviorally stated competencies.
2. The competencies suggested by authorities and teachers were all included. Generic competencies were not removed.
3. The Business Education Index (1968-1973) and the National Business Education Association Yearbook (1968-1973) were used to compile the authorities list and may not include all articles written on the topic of data processing.

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<sup>8</sup>Allen A. Schmieder, The State of the Scene, No. 9 Performance-Based Teacher Education Series, (Washington, D.C.: AACTE, 1973), p. 10.

### Delimitations of the Study

The study was conducted under the following delimitations:

1. The classroom teacher population surveyed was limited to Texas high school and junior college teachers teaching introductory data processing whose names appeared on either the Texas Education Agency list or on the list compiled by South-Western Publishing Co.
2. The review of related research and literature was limited to studies, books, and articles published from 1968 through 1973 in the business education field and may not have included all literature on the subject of data processing.
3. The population of data processing authorities was limited to authorities in the United States and Canada who had published two or more data processing related articles in United States business education publications during the period 1968 through 1973.

### Definition of Terms

Although the terms used in this study will ordinarily be understood by business teacher educators, several terms are defined as they are used in this study to insure clarity of thought and understanding.

Business Education. This term is used to refer to school learning (1) to develop skills and occupational intelligence in preparation for business occupations; and (2) to make students

better consumers of the services of business and better members of the economic structure.<sup>9</sup>

Business Data Processing Authorities. Authors of two or more data processing related articles, research studies, or textbooks published during the past six years (1968-1973) and listed in either the Business Education Index or the National Business Education Yearbook.

Business Teacher Education. Professional preparation of teachers in the field of business education.<sup>10</sup>

Competency-Based Teacher Education (CBTE). An approach to teacher education stressing performance-based programs and performance goals which are specified, and agreed to, in rigorous detail in advance of instruction. The student must either be able to demonstrate his ability to promote desirable learning or exhibit behaviors known to promote it. He is held accountable for attaining a given level of competence

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<sup>9</sup>Herbert A. Tonne and Louis C. Nanassy, Principles of Business Education (4th ed.; New York: McGraw-Hill Book Co., 1970), p. 12.

<sup>10</sup>C. A. Nolan, Carlos K. Hayden, and Dean R. Malsbury, Principles and Problems of Business Education, (Cincinnati, Ohio: South-Western Publishing Co., 1967), p. 6.

in performing the essential tasks of teaching. The training institution is held accountable for producing able teachers.<sup>11</sup>

Competency. A competency is knowledge, skills, and judgment which the student will demonstrate at a predetermined proficiency level before initial and/or continuing certification.<sup>12</sup>

Data Processing. Manipulation of factual matter of all kinds for the purpose of producing a desired answer or result. The term includes recording, classifying, sorting, calculating, summarizing, communicating, and storing of information, whether manual or by machine.<sup>13</sup>

Introductory Data Processing Course. A survey course overiewing manual data processing, unit-record data processing, and electronic data processing. The time span covered can vary and equipment may or may not be used. The course may be offered at the high school or junior college level.

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<sup>11</sup>Fred S. Cook, Charlotte L. Neuhauser, and Rita C. Richey, "A Working Model of a Competency-Based Teacher Education System," Department of Vocational and Applied Arts Education, Wayne State University, Detroit, Michigan, p. 2. (Mimeographed.)

<sup>12</sup>Ibid.

<sup>13</sup>S. J. Wanous, E. E. Wanous, and Gerald E. Wagner, Fundamentals of Data Processing, (Cincinnati, Ohio: South-Western Publishing Co., 1971), p. 389.

Modal Consensus. Response which occurs most often in a frequency distribution.<sup>14</sup>

Bimodal Consensus. Two responses which are the highest in the distribution and have occurred with the same frequency.<sup>15</sup>

Trimodal Consensus. Three responses which are the highest in the distribution and have occurred with the same frequency.

Dodl's Categories. A taxonomy of teacher competencies, developed by Norman Dodl, which includes the following:

- a. Assessing and evaluating student behavior
- b. Planning instruction
- c. Conducting or implementing instruction
- d. Performing administrative duties
- e. Communicating
- f. Developing personal skills
- g. Developing pupil-self<sup>16</sup>

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<sup>14</sup>Deobold B. Van Dalen and William J. Meyer, Understanding Educational Research, (New York: McGraw-Hill Book Company, 1966), p. 334.

<sup>15</sup>Ibid.

<sup>16</sup>Norman Dodl, The Florida Catalog of Teacher Competencies, (Tallahassee, Florida: Department of Education, 1973), p. 417.

## SUMMARY

The most important link between the student and a smooth entry into society and the work force is the teacher. A search of the literature revealed that there is no body of data related to competencies needed by teachers in order to effectively teach introductory data processing.

This study was designed to establish a rank-ordered list of competencies which introductory data processing teachers should possess and analyze these competencies as perceived by Texas data processing teachers and American and Canadian authorities in the business education field.

## Chapter 2

### METHOD OF PROCEDURE

The procedures followed in conducting this study are presented in this section under three major divisions:

(1) Design of the Study, (2) Development and Distribution of the Questionnaires, and (3) Organization of the Report.

### DESIGN OF THE STUDY

The study was designed to contain the following four major steps with several substeps.

#### Development of the Questionnaire

The initial questionnaire, containing 106 competencies, was developed by the researcher from an observation of practicing data processing teachers and from a review of textbooks, research studies, and journal articles.

During the school year 1973-74, four practicing data processing teachers were observed by the researcher. Two of the teachers taught introductory data processing at the high school level and two taught introductory data processing at the junior college level. A list of nineteen competencies were recorded during these observations. (Appendix B, page 141).

A review of research studies, journal articles, and textbooks yielded an additional 87 competencies which were added to the original list. A bibliographical list of literature used in determining this list is found in Appendix C, page 143.

The questionnaire developed from this list categorized the competencies according to the Dodl taxonomy which includes planning, administration, instruction, communication, evaluation, developing pupil-self, and developing personal skills.<sup>17</sup> The questionnaire was then submitted to a jury, consisting of two business education professors and a class of graduate-level business education students, for assistance in editing.

#### Selection of Classroom Teachers

A list was provided the researcher by the Texas Education Agency which contained the names and addresses of data processing teachers at the high school and junior college level. South-Western Publishing Company submitted to the researcher a list of data processing teachers appearing on their mailing list. These two lists were combined into one list to comprise the population of teachers to be used in the study.

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<sup>17</sup>Dodl, op. cit.

The lists supplied did not indicate whether the teachers taught introductory data processing. Therefore, the total population of teachers was contacted to establish which teachers taught introductory data processing and to request their participation in the study.

On September 10, 1974, a letter was sent to all teachers listed, and a reply postal card to facilitate answering was enclosed (Appendix D, page 145). A total of 258 letters were sent, 178 to junior college teachers and eighty to high school teachers. Sixty-four junior college teachers (36 percent) and 26 high school teachers (32.5 percent) responded and agreed to participate in the study.

#### Selection of Business Data Processing Authorities

The Business Education Index (1967-1973) and the National Business Education Association Yearbook (1967-1973) were consulted for authors of data processing articles. Those authors who published two or more articles in the past six years were selected for the initial authorities list. This initial list contained the names of 89 business data processing authorities. The researcher was unable to obtain addresses for three authorities.

On September 10, 1974, letters were sent to 86 authorities briefly describing the study and requesting their participation (Appendix E, page 150). A reply postal card was enclosed to

facilitate answering (Appendix E, page 152). Forty-one authorities, or 48 percent, agreed to participate.

#### Use of the Delphi Technique

A modified Delphi technique was used as a tool for gathering, organizing, and sharing opinions of the participants in the study.

The Delphi technique was originally used to forecast the future. For that purpose, a series of questionnaires were mailed to participants who were anonymous to one another. The first questionnaire asked for a statement of opinion regarding the probable occurrence of future events. The second questionnaire gave estimates of the probability of each event occurring at a given date in the future. Responses to the second questionnaire were collated and returned to the respondents who were asked to revise their estimates. The third-round estimates were made with the knowledge of the responses of other participants. Responses to the third questionnaire were reported back to the participants and, if their responses did not fall within the inter-quartile range of all conjecture, they were asked to justify or change their positions.<sup>18</sup>

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<sup>18</sup> W. Timothy Weaver, "The Delphi Forecasting Method," Phi Delta Kappan, LII (January, 1971), 267-271.

This technique has definite advantages over the traditional round-table discussion used at most committee meetings. Expert opinions can be gained without the expense of bringing the experts together in a common meeting place. Opinions expressed are more reflective of the honest viewpoints of experts since undue pressure cannot be placed on minority members of a group by persons of higher rank or authority.<sup>19</sup>

The modified Delphi technique used in this study was modeled after the modification used successfully in the Prather<sup>20</sup> and Hebert<sup>21</sup> studies. These researchers eliminated one questionnaire by preparing an initial questionnaire containing a partial list of competencies which the participants were asked to rate, revise, and expand. Space was provided at the end of each category for expansion of the list. Rating was accomplished

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<sup>19</sup>Frederick R. Cyphert and Walter L. Gant, "The Delphi Technique: A Case Study," Phi Delta Kappan, LII (January, 1971), 272-273.

<sup>20</sup>Helen Prather, "An Analysis of Competencies Needed by Shorthand Teachers as Perceived by Business Teachers and by Authorities in Business Education," (unpublished doctor's dissertation, University of Houston, 1974), pp. 12-14.

<sup>21</sup>Margaret Hebert, "An Analysis of Competencies Needed by Typewriting Teachers as Perceived by Business Teachers and by Authorities in Business Education," (unpublished doctor's dissertation, University of Houston, 1973), p. 23.

using the following criteria: (C) Crucial, (H) Highly Desirable, (D) Desirable, but not absolutely necessary, (N) Nonimportant, (I) Incorrectly stated; needs revision, and (X) Do not use; concept inappropriate.

#### Distribution of the Questionnaire

On October 13, 1974, Questionnaire I (Appendix F, page 156) was mailed to a sample of 41 authorities, 64 junior college teachers, and 26 high school teachers, along with a stamped return envelope. The letter of transmittal (Appendix F, page 154) accompanying the questionnaire thanked the respondents for agreeing to participate in the study and requested that they rate each competency in this initial questionnaire, revise those competencies they thought could be improved, and add competencies to the list. Authorities, high school, and junior college teachers received identical questionnaires. However, the questionnaires mailed to high school and junior college teachers were accompanied by a covering questionnaire (Appendix G, page 169) requesting background information. This request was not made of authorities.

Follow-up letters (Appendix H, page 170) were mailed on November 12 requesting a prompt return of the completed questionnaire. A total of 35 authorities, 55 junior college teachers, and 21 high school teachers completed and returned the first questionnaire, which represented 87 percent of the sample.

Respondent ratings were tallied and analyzed by the researcher. Competencies receiving a number of (N) Nonimportant, or (X) Do not use; concept inappropriate ratings were re-evaluated. None of the competencies were eliminated because, in every instance, the (C) Crucial, (H) Highly Desirable, and (D) Desirable, but not absolutely necessary ratings outnumbered the (N) and (X) ratings. Competencies receiving a number of (I) ratings by respondents were reworded. Comments of respondents were categorized and combined into a typewritten list. The questionnaire was then methodically revamped to reflect the opinions of respondents.

On November 27, 1974, Questionnaire II (Appendix I, page 174) was mailed to 55 junior college teachers, 21 high school teachers, and 35 authorities, along with a letter of transmittal (Appendix I, page 173) and a stamped return envelope. Participants were advised that the questionnaire had been revised to include their suggestions. Questionnaire II asked that the participants rate the revised and expanded list of competencies again using the coding (C) Crucial, (H) Highly Desirable, (D) Desirable, but not absolutely necessary, (N) Nonimportant, (I) Incorrectly stated--needs revision, and (X) Do not use--concept inappropriate. The coding was repeated twice for each competency. High school teachers were asked to indicate their rating of each competency using the coding

marked (S). Junior college teachers were asked to indicate their rating of each competency using the coding marked (J). Authorities were asked to respond to the competencies by indicating their rating of each competency for high school teachers in the space marked (S) and their rating of the competency for junior college teachers in the space marked (J). The researcher requested that the completed instrument be returned by December 6, 1974.

A follow-up letter (Appendix J, page 190) was mailed to participants who had not returned the questionnaire by December 16, 1974. A total of 102 questionnaires were completed and returned, 34 from authorities, 48 from junior college teachers, and 20 from high school teachers.

The third questionnaire, mailed to participants January 17, 1975, was identical to Questionnaire II except that a black square had been drawn around the rating reflecting the modal consensus (responses which occurred most often) and the respondents' ratings had been encircled in red. A bimodal consensus was reported with two black squares, and a trimodal consensus was reported with three black squares. Respondents were asked to review their responses in relation to the modal consensus and consider joining the consensus. Respondents remaining outside the modal consensus were asked to give a brief reason for doing so. (Questionnaire III and cover letter are shown in Appendix K, page 192.)

On February 7, a follow-up letter was mailed to participants whose responses had not been received. (See Appendix L, page 211). Follow-up telephone calls were made on February 18. By February 24, completed questionnaires had been received from 31 authorities (76 percent of the sample), 44 junior college teachers (69 percent of the sample) and 19 high school teachers (73 percent of the sample).

Table 1, representing the number and percentage of return of the questionnaires, is given below.

Table 1

Number of Questionnaires Mailed  
Number and Percentage of  
Questionnaires Returned

| Question-<br>naires | Number<br>Sent |     |     | Number<br>Returned |    |    | Percentage<br>of Return |    |    |
|---------------------|----------------|-----|-----|--------------------|----|----|-------------------------|----|----|
|                     | A*             | JC* | HS* | A                  | JC | HS | A                       | JC | HS |
| I                   | 41             | 64  | 26  | 35                 | 55 | 21 | 85                      | 86 | 81 |
| II                  | 35             | 55  | 21  | 34                 | 48 | 20 | 83                      | 75 | 77 |
| III                 | 34             | 48  | 20  | 31                 | 44 | 19 | 76                      | 69 | 73 |

A\*     Authorities  
JC\*    Junior College Teachers  
HS\*    High School Teachers

## SUMMARY

From the initial list of 89 data processing authorities, requests were made to 86 (three addresses were unavailable). Forty-one authorities (48 percent) agreed to participate. Of the 178 junior college teachers and 80 high school teachers in Texas who were teaching data processing, 64 junior college teachers (36 percent) and 26 high school (33 percent) reported that they were teaching introductory data processing and agreed to participate in the study. Through the modified Delphi technique, the competencies were developed and used for analysis in this study. Participants responding to all three questionnaires included 31 authorities (76 percent), 44 junior college teachers (69 percent), and 20 high school teachers (73 percent).

Chapter 3, which follows, deals with related literature and research.

## Chapter 3

### REVIEW OF RELATED LITERATURE AND RESEARCH

A search of the literature revealed an adequacy of material concerning the effect of automation on business and education. Competency-based teacher education literature was available in abundance and was reviewed. Articles published in the National Business Education Association Yearbook and Business Education Index (1967-1973) were reviewed for identification of authorities. Textbooks, research studies, and journal articles were examined, along with other sources, for teacher competencies to be used in developing the initial questionnaire. Two studies and one journal article were found which directly relate to business teacher competencies.

### DATA PROCESSING

The computer was first used in offices for processing data in 1954.<sup>22</sup> During the two decades following its introduction, the

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<sup>22</sup>F. Kendrick Bangs, "The Teaching of Data Processing," National Business Education Association Yearbook, Ninth Yearbook, (Washington: National Business Education Association, 1971), p. 60.

computer has greatly altered many areas of business and is rapidly becoming an integral part of all segments of our society. It is being used to prepare payrolls, keep bank accounts, check on the credit standing of customers, verify income tax returns, and to control the production of everything from bread to steel.<sup>23</sup>

Hanson describes the magnitude of the changes attributed to the arrival of computers:

Although the computer may be classified as a product of the electrical manufacturing industry, no other item of capital goods has changed the basic terms of so many human activities worldwide in so short a time. It has altered profoundly the techniques of science, government, and national defense. Above all, it is changing radically our business production methods, the science of management, and data information systems.<sup>24</sup>

The initial reaction to the computer was fear that machines would replace people in the office. Twenty years into automation have produced just the opposite phenomenon. Although a realignment of personnel has occurred, personnel in offices increased steadily through the sixties, and a further increase is projected in the seventies.<sup>25</sup>

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<sup>23</sup>S. J. Wanous, E. E. Wanous, and Gerald E. Wagner, Fundamentals of Data Processing (Cincinnati, Ohio: South-Western Publishing Co., 1971), p. 10.

<sup>24</sup>Robert D. Hanson, "An Integrated Approach to Teaching Data Processing and Bookkeeping/Accounting," Business Education Forum, XXV (March, 1971), 24-26.

<sup>25</sup>Bangs, op. cit.

Early education of data processing personnel was handled by manufacturers of the machines. Business educators attempted to respond to the need created by the demand for employees trained to function in data processing and manufacturers cooperated by making expensive equipment available at little or no cost to the schools.

Educational background played an important role in maintaining positions or achieving promotions in offices where the computer had been introduced.

In 1960, the U. S. Department of Labor reported, based on a 1957 study, that 42 per cent of the personnel working in offices where the computer had been introduced had completed some college work or graduated from college and that 78 percent of those hired had either a degree or some college work.<sup>26</sup>

A survey of 100 data processing personnel in Los Angeles, conducted by Goodman (1961), indicated that 30 percent of the data processing specialists and management personnel had received four years of college.<sup>27</sup>

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<sup>26</sup>Bangs, op. cit.

<sup>27</sup>C. J. Goodman, "Education for Business Data Processing," Office Executive, XXXVI (May, 1961), 18-20.

Studies conducted by Carter (1967),<sup>28</sup> Gibson (1967),<sup>29</sup> Godby (1966),<sup>30</sup> Hoos (1961),<sup>31</sup> and Korn (1968)<sup>32</sup> revealed a slight trend toward hiring people who had been trained in high school, junior college, or universities. At this time, however, many educational institutions were not yet offering programs in data processing.

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<sup>28</sup>D. M. Carter, "A Study of Office Training Programs for Data Processing Personnel in Selected Businesses in Colorado, with Implications for Business Education," Dissertation Abstracts, 65-11601, 26:2521, November, 1965.

<sup>29</sup>G. M. Gibson, "A Study of Office Automation in Selected Business Firms of the Greater Boston Area with Implications for Curriculum Planning," Dissertation Abstracts, 69-07808, 29:4164, May, 1969.

<sup>30</sup>C. K. Godby, "Clerical Employees in Data Processing Occupations," The Balance Sheet, October, 1966, pp. 59-60.

<sup>31</sup>F. Kendrick Bangs, "The Teaching of Data Processing," National Business Education Association Yearbook, IX (1971), citing I. R. Hoos, Automation in the Office, (Washington, D.C.: Public Affairs Press, 1961), pp. 60-61.

<sup>32</sup>W. M. Korn, "An Achievement Test for the Course Introduction to Business Data Processing," Dissertation Abstracts, 68-14730, 29:1045, October, 1968.

The President's Science Advisory Committee issued a report entitled "Computers in Higher Education," (1967) which stated that unless all college graduates have a knowledge of computers and how they operate, they have missed a valuable part of higher education. In 1971, Richard B. Otte of the United States Office of Education reiterated the above statement adding that the same statement can now be applied to today's high school graduate.<sup>33</sup>

A study conducted by the United States Office of Education in 1966 to examine the economic and technological feasibility of providing instructional and administrative support services to large numbers of high school and junior college students established that the schools at that time were not fulfilling their obligations in computer education.<sup>34</sup>

Bangs said of these early studies:

In spite of the fact that much effort has been expended in investigation of the educational implications of automation in the office, nothing conclusive was produced prior to 1968.

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<sup>33</sup>Richard B. Otte, "Computer Instruction in Business Education," National Business Education Association Yearbook, IX (1971), p. 6, citing "Relationship of Automatic Data Processing Training Curriculum and Methodology in the Federal Government," Document No. FS 5.280:80066, (Washington, D. C.: Government Printing Office, 1969).

<sup>34</sup>Ibid.

The studies tended to be unreliable because of the limited biased samples. The findings cannot be generalized either because the studies were extremely localized geographically. Consequently, business educators knew relatively little more about what to teach in and about data processing or when and where to teach it as a result of these research studies.<sup>35</sup>

Weber described the responses of educators when confronted with the task before them. A basic lack of understanding existed, accompanied by a fear of the high cost of equipment and an absence of qualified technical personnel. However, data processing could not be overlooked. The problems must be overcome.<sup>36</sup>

Meanwhile, technological advances continued to improve computers. One generation of computers rapidly followed another, with each new arrival producing data at faster speeds. This meant that more data went in and more data came out. These changes were accompanied by increasing demands for trained clerical personnel to handle these input/output tasks. An overview of the data processing field, in addition to the traditional clerical training, might better equip these employees to perform the roles expected by employers.

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<sup>35</sup>F. Kendrick Bangs and Mildred C. Hillestad, Curricular Implications of Automated Data Processing, BR 5-0144, OE6-85-030, (St. Peter, Minn.: Delta Pi Epsilon, 1968), pp. 87-88.

<sup>36</sup>James F. Weber, "Data Processing Education--Can Community Colleges Do the Job?" Business Education Forum, XXIII, (April, 1969), 27-28.

## INTRODUCTORY DATA PROCESSING

The literature abounds with expressions of the need for introductory data processing courses at the high school and junior college level. Bux,<sup>37</sup> Korn,<sup>38</sup> Haga,<sup>39</sup> Miller,<sup>40</sup> Baram,<sup>41</sup> Baulch,<sup>42</sup> and Thompson,<sup>43</sup> reflect the view that every high school business student should have an exposure to data processing as a discrete discipline. Reese<sup>44</sup>

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<sup>37</sup>William Bux, "Entry-Level Office Positions Require Education in Data Processing," Business Education Forum, XXIV (March, 1970), 18-20.

<sup>38</sup>Bill Korn and Lewis E. Wall, "Profile of a Data Processing Teacher," Business Education Forum, XXII (April, 1968), 16-18.

<sup>39</sup>Enoch Haga, "Introductory Automation and Data Processing for All High School Students," Business Education Forum, XXII (May, 1968), 16-18.

<sup>40</sup>Robert Miller and J. S. Walden, "DE Meets DP," Balance Sheet, LV (November, 1973), 115-17.

<sup>41</sup>Giora Baram, C. Joseph Sass, and S. A. Yarborough, "Development of an Introductory EDP Course," Business Education Forum, XXV (November, 1970), 47-48.

<sup>42</sup>Janet Baulch, "Consider An EDP Course for All High School Students," Business Education Forum, XXV (November, 1970), 31-32.

<sup>43</sup>Van B. Thompson, "Meaningful Data Processing Training in High Schools," Journal of Business Education, XLVI (January, 1971), 148-50.

<sup>44</sup>Don Reese, "Data Processing Courses in High School?" Journal of Business Education, XL (January, 1970), 153-54.

challenged Thompson's stand on the need for data processing education at the high school level, preferring rather to stress the basic fundamentals such as English, mathematics, social studies, and basic business. However, he too acknowledged the need for high school students to have an understanding of computers and the role they play in business.

Bangs and Hillestad (1968)<sup>45</sup> published a major study which established, among other things, that an introductory data processing course should be offered in the tenth grade in secondary schools and during the freshman and sophomore levels in junior colleges and universities. They suggested that the high school course should be a one-semester course, including a history of records systems and manual data processing, tabulating cards and equipment, electronic computer logic, flow charting, and computer operation.

At the postsecondary level, Bangs and Hillestad suggested that the introductory course also be a one-semester course, including the history of data processing, principles of data processing, an overview of unit record, card layout and design, flow charting, elements of programming, laboratory in data processing and number systems.

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<sup>45</sup>Bangs, op. cit.

Through an analysis of textbooks and interviewing procedures, Korn (1968)<sup>46</sup> compiled the following list of topics usually covered in Introduction to Business Data Processing courses: history of data processing, purpose and function of unit-record equipment, input/output media and devices, primary storage and retrieval, arithmetic and logic functions of the computer, control unit, introduction of programming, and the total systems concept.

Carter and Gibson<sup>47</sup> conducted a study to determine sequencing of events taught in the beginning course introducing students to data processing. Their sequencing ranged from history of data processing to management and organization.

#### DATA PROCESSING TEACHER EDUCATION

Couger<sup>48</sup> perceived the greatest inhibiting factor in progressing toward adequate education in data processing to be

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<sup>46</sup>Bill Korn and Lewis E. Wall, "Profile of a Data Processing Teacher," Business Education Forum, XXII (April, 1968), 16-18.

<sup>47</sup>Deane M. Carter and Harry L. Gibson, "An Analysis of the Introductory Business Data Processing Course," Journal of Business Education, XLVII (May, 1971), 318-21.

<sup>48</sup>J. Daniel Couger, "Educating Faculty About Computers," Journal of Business Education, XLIV (March, 1969), 249-50.

the shortage of faculty capable of teaching the data processing curriculum. He expressed the belief that teachers should be able to comprehend journal articles, to keep up to date on developments in computer technology, and to have an understanding of computer concepts.

Otte<sup>49</sup> attributes the shortage of teachers knowledgeable in data processing to the fact that university data processing courses are being offered in the computer science or mathematics departments and are not being offered for the preparation of teachers in the colleges of education.

Wood<sup>50</sup> categorizes data processing teachers into two areas: those who teach skills and those who teach about data processing. He outlined eight major areas an introductory data processing teacher should be knowledgeable in: (1) development of record systems, (2) need for automated data processing, (3) uses of data processing, (4) data handling, (5) electronic data processing, (6) computer systems, (7) data processing department, and (8) advanced training sources.

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<sup>49</sup>Otte, op. cit.

<sup>50</sup>Merle W. Wood, "A Methods Course for Business Data Processing Teachers," Journal of Business Education, XLVI (April, 1971), 277-78.

Hamed<sup>51</sup> described the need for all business teachers to have a sound introductory knowledge of the elements of automated data processing in order to keep up with the times and to aid in the integration of data processing concepts into other business curricula.

Westley<sup>52</sup> attributes the absence of a body of data processing methodology in the business curriculum to the fact that data processing is so new to the business curriculum and has been in a constant state of change.

#### COMPETENCY-BASED TEACHER EDUCATION

An innovative approach to education which could aid business education in meeting the challenge of computerized data processing is competency-based teacher education. Competency-based teacher education (CBTE) places emphasis on objectives which are spelled out in advance. Students are told explicitly at the outset of a course what behaviors will be expected of them on exiting from the course.

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<sup>51</sup>Charles J. Hamed, "Data Processing," Business Education Forum, XXVII (May, 1970), 27.

<sup>52</sup>John W. Westley, "Data Processing," National Business Education Association Yearbook, No. 10, (1972), pp. 167-82.

Time is not held as a constant. Achievement is held as a constant and time can vary. CBTE focuses on exiting requirements rather than on entering requirements. Competency-based teacher education is a learner-oriented approach to teacher education.<sup>53</sup>

A good deal of work has been done in the state of Oregon in developing competency-based programs. They approach teaching competence as something more than the mastery of knowledge and simple teaching skills or behaviors. Teaching competence is defined as:

The demonstrated ability to bring about the expected outcomes of a role or function in a job definition.

A competent teacher is defined as:

One who has acquired and demonstrated the essential competencies of a professional position and integrates and utilizes them effectively in meeting the requirements of that position in accordance with its level and certification status. At each certification level, the teacher must also provide evidence that he has mastered the knowledge and skills assumed to be required for the development of his teaching competence at that level.

When the approach is taken that teaching competence is more than the mastery of knowledge and simple teaching skills, then assessment becomes complex. Schalock reports that in the eyes

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<sup>53</sup>James M. Cooper, Wilford A. Weber, and Charles E. Johnson, A Competency-Based Systems Approach to Program Design, (Berkeley, California: McCutchan Publishing Corporation, 1973), p. 14.

of many, it takes on properties that demand more from the technology of measurement and evaluation than that technology has at the moment to give.<sup>54</sup>

The first step in an assessment program is establishment of specific outcomes desired--specific teacher competencies to be assessed. This study is designed as the first step toward an assessment program for teachers of introductory data processing.

### BUSINESS TEACHER COMPETENCIES

Studies by Prather (1974) and Hebert (1973) evidence the fact that business education is progressing rapidly toward the establishment of a firm research base in specific competencies needed to teach business education subjects.

Prather surveyed Texas shorthand teachers and national business education authorities to determine perceptions and differences in perceptions of these groups concerning competencies needed to teach shorthand. Prather analyzed these perceptions

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<sup>54</sup>H. Del Schalock, et al. (ed.) "A Plan for Managing the Development, Implementation and Operation of a Model Elementary Teacher Education Program," (Monmouth, Oregon: Oregon College of Education, 1970), p. 6. (Mimeographed.)

through use of a chi-square to identify competencies common to both groups and developed a rank-ordered list of shorthand teacher competencies suitable for use in a competency-based teacher education program.<sup>55</sup>

Hebert conducted a survey of typewriting teachers in the metropolitan Houston area and national business education authorities relative to their perceptions of competencies needed to teach beginning typewriting. Using a chi-square test to analyze these perceptions, Hebert developed a list of competencies needed to effectively teach beginning typewriting.<sup>56</sup>

Both Prather and Hebert cited the need for a list of competencies needed to teach data processing.

McCullough made a contribution toward filling the need for a list of competencies needed by the teacher of data processing. In an article which included competencies needed for teaching Business Machines, Office Practice, Basic Business, Shorthand, Typewriting, Bookkeeping/Accounting/Recordkeeping, and Data Processing, she wrote that the beginning business teacher who

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<sup>55</sup>Prather, loc. cit.

<sup>56</sup>Hebert, loc. cit.

teaches data processing should possess the following competencies:

1. Knowledge of current data processing methods and equipment.
2. Knowledge of the development of data processing, including people who have made contributions such as the adding machine, calculator, difference engine, etc., that an introductory course would provide.
3. Knowledge of computers and computer terminology that an introductory course would provide.
4. Ability to develop learning activities that will motivate student participation.
5. Knowledge of the punched card and its use in recording data.
6. Knowledge of the various visual and mechanical aids, as teaching tools.
7. Ability to set up performance standards for a given group of students.
8. Knowledge of computer programming and how to teach programming techniques.
9. Knowledge of the variety of curriculum patterns used in secondary schools for teaching data processing, including integrating data processing into other business courses.<sup>57</sup>

Although McCullough has taken a step toward establishing a list of teacher competencies in the data processing area, the

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<sup>57</sup>Edith McCullough, "Performance-Based Business Teacher Education," California Business Education Journal, VII (May, 1973), 21-28.

list was not based on research and is not an extensive list of teacher competencies. The need for a research-based list still exists. This study was designed to fill this need.

## SUMMARY

Review of secondary sources related both to data processing and competency-based teacher education reinforced the need for research in the area of competencies needed to teach introductory data processing. Competency-based teacher education literature reflected the critical need for assessment in implementing a CBTE program. A list of specific competencies needed to teach introductory data processing is a vital step toward teacher assessment. The need for all students, high school and college, to have an introduction to data processing was well documented by the literature.

The following chapter contains the primary data related to this study obtained from a three-questionnaire survey of Texas high school and junior college teachers of introductory data processing and business data processing authorities in the United States and Canada.

## Chapter 4

### SUMMARY OF DATA

This chapter is divided into the following four major divisions: (1) a description of the population, (2) development and presentation of data from Questionnaire I, (3) development and presentation of data from Questionnaire II, and (4) presentation and interpretation of the data from Questionnaire III.

### THE POPULATION

The participants in this study consisted of three groups of people--American and Canadian business data processing authorities, Texas high school teachers, and Texas junior college teachers. Both writers and practitioners were involved in identifying the competencies by using these three groups. Representatives of the teacher-training institutions (business data processing authorities) and graduates of teacher-training institutions (teachers) were represented in this research.

#### Business Data Processing Authorities

Of the 31 respondents in the authorities group, all except three were directly involved in collegiate institutions. Of these three, two were involved in public school administration, and one

was employed by Educational Testing Service.

### High School and Junior College Teachers

All nineteen high school teachers and 44 junior college teachers taught at least one introductory data processing course. As shown in Table 2, the two teacher groups reported similar educational backgrounds. Seventeen of the high school teachers (89 percent) had earned at least their bachelor's degree, while ten (52 percent) had completed their master's degree, and one (5 percent) had earned 54 hours toward a doctorate. Of the 44 responding junior college teachers, 41 (94 percent) had earned at least their bachelor's degree, 28 teachers (64 percent) had earned their master's degree, and one teacher (2 percent) had received a doctorate.

Table 2

#### Educational Background of Responding High School and Junior College Teachers

| Teachers       | Degree | A.A. | B.A.<br>B.S. | M.A.<br>M.S. | Ph.D.<br>Ed.D. | Total |
|----------------|--------|------|--------------|--------------|----------------|-------|
| High School    |        |      |              |              |                |       |
| Number         | 1      | 1    | 7            | 10           |                | 19    |
| Percentage     | 5      | 5    | 36           | 52           |                |       |
| Junior College |        |      |              |              |                |       |
| Number         | 1      | 1    | 13           | 28           | 1              | 44    |
| Percentage     | 2      | 2    | 30           | 64           | 2              |       |

As indicated in Table 3, none of the high school teachers reported having worked more than 20 years in a business office, while three junior college teachers (7 percent) had worked in excess of 20 years in business offices. Twenty-seven of the junior college teachers (61 percent) and ten of the high school teachers (52 percent) had worked in business for five or more years.

Table 3

Office Work Experience of Responding High  
School and Junior College Teachers

| Teachers       | Years |      |       |       |     | Total |
|----------------|-------|------|-------|-------|-----|-------|
|                | 0-4   | 5-10 | 11-15 | 16-20 | 20+ |       |
| High School    |       |      |       |       |     |       |
| Number         | 9     | 7    | -0-   | 3     | -0- | 19    |
| Percentage     | 47    | 37   |       | 16    |     |       |
| Junior College |       |      |       |       |     |       |
| Number         | 17    | 15   | 4     | 5     | 3   | 44    |
| Percentage     | 39    | 34   | 9     | 11    | 7   |       |

As Table 4 illustrates, greater similarity was reported by the two groups concerning data processing work experience. Four

high school teachers (22 percent) and five junior college teachers (11 percent) reported having had no data processing work experience. Three high school (16 percent) and three junior college teachers (7 percent) had worked between 16 and 20 years in business data processing.

Table 4

Data Processing Work Experience of Responding  
High School and Junior College Teachers

| Teachers       | Years |     |      |       |       | Total |
|----------------|-------|-----|------|-------|-------|-------|
|                | -0-   | 1-4 | 5-10 | 11-15 | 16-20 |       |
| High School    |       |     |      |       |       |       |
| Number         | 5     | 10  | 1    | -0-   | 3     | 19    |
| Percentage     | 26    | 53  | 5    |       | 74    |       |
| Junior College |       |     |      |       |       |       |
| Number         | 4     | 19  | 15   | 3     | 3     | 44    |
| Percentage     | 9     | 43  | 34   | 68    | 68    |       |

Table 5 reflects the data processing teaching experience of responding high school and junior college teachers. Ten high school teachers (53 percent) and thirty junior college teachers (68 percent) reported five years or more experience in teaching data processing.

Table 5

Experience in Teaching Data Processing of Responding  
High School and Junior College Teachers

| Teachers       | Years |     |     |      |       | Total |
|----------------|-------|-----|-----|------|-------|-------|
|                | 0-2   | 3-4 | 5-6 | 7-10 | 11-20 |       |
| High School    |       |     |     |      |       |       |
| Number         | 6     | 3   | 2   | 7    | 1     | 19    |
| Percentage     | 32    | 18  | 10  | 37   | 53    |       |
| Junior College |       |     |     |      |       |       |
| Number         | 8     | 6   | 12  | 14   | 4     | 44    |
| Percentage     | 18    | 14  | 27  | 32   | 9     |       |

As shown in Table 6, all of the high school teachers reported having taken at least one data processing course. However, two of the junior college teachers had taken no course work in data processing. Eleven (58 percent) of the high school teachers and 35 (85 percent) of the junior college teachers had taken a minimum of four data processing courses. One high school teacher (5 percent) and two junior college teachers (5 percent) had completed more than twenty data processing courses.

Table 6

Data Processing Courses Taken by High  
School and Junior College Teachers

| Teachers       | Number of Courses |     |      |       |       |     | Total |
|----------------|-------------------|-----|------|-------|-------|-----|-------|
|                | -0-               | 1-4 | 5-10 | 11-15 | 16-20 | 20+ |       |
| High School    |                   |     |      |       |       |     |       |
| Number         | -0-               | 14  | 4    | 1     | -0-   | 1   | 19    |
| Percentage     |                   | 74  | 21   | 5     |       | 5   |       |
| Junior College |                   |     |      |       |       |     |       |
| Number         | 2                 | 11  | 24   | 2     | 3     | 2   | 44    |
| Percentage     | 5                 | 25  | 55   | 4     | 7     | 4   |       |

As illustrated in Table 7, the number of data processing courses offered by the respondents' schools ranged from one to four courses in the high schools and from four to twenty or more courses in the junior colleges. Seventeen high schools (89 percent) offered three or more data processing courses while 27 junior colleges (61 percent) offered eleven or more data processing courses.

Table 7

Data Processing Courses Offered  
by Respondents' Schools

| Schools        | Number of Courses |      |       |       |     | Total |
|----------------|-------------------|------|-------|-------|-----|-------|
|                | 1-4               | 5-10 | 11-15 | 16-20 | 20+ |       |
| High School    |                   |      |       |       |     |       |
| Number         | 19                | -0-  | -0-   | -0-   | -0- | 19    |
| Percentage     | 100               |      |       |       |     |       |
| Junior College |                   |      |       |       |     |       |
| Number         | 1                 | 16   | 15    | 3     | 9   | 44    |
| Percentage     | 2                 | 36   | 34    | 7     | 20  |       |

Reported data processing equipment available to both groups of teachers was impressive. All 44 junior college teachers (100 percent) and fourteen of the high school teachers (74 percent) indicated that data processing equipment was available in their schools for student use.

In the junior college group, eight (18 percent) of the 44 teachers reported that unit-record equipment, electronic data processing equipment, and time sharing were available in their schools. Twenty-one respondents (50 percent) had both unit-record and electronic data processing equipment for use by their students. Electronic data processing equipment and time sharing were used by five (11 percent) of the responding junior

college teachers, while nine (20 percent) used only electronic data processing equipment in their schools.

Of the nineteen high school teachers, five (26 percent) reported having no data processing equipment for use by students. However, two (10 percent) used only time sharing, three (16 percent) used time sharing along with electronic data processing equipment, one (5 percent) used time sharing, electronic data processing equipment and unit-record equipment, three (16 percent) used only electronic data processing equipment, four (21 percent) used both unit-record equipment and electronic data processing equipment, and one (5 percent) used only unit-record equipment.

#### DEVELOPMENT AND PRESENTATION OF QUESTIONNAIRE I

Questionnaire I, containing 107 competencies, was modeled after the Hebert<sup>58</sup> study. This questionnaire was developed by the researcher from an observation of practicing data processing teachers and from a review of textbooks, research studies, and journal articles.

The competencies were categorized using the Dodl<sup>2</sup>

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<sup>58</sup>Hebert, op. cit.

<sup>59</sup>Dodl, op. cit.

taxonomy which includes planning, administration, instruction, communication, evaluation, developing pupil-self, and personal attributes. The questionnaire was submitted to a jury, consisting of two business education professors and a class of graduate-level business education students, for assistance in editing.

The questionnaire (Appendix F, page 156) was then submitted to the business data processing authorities, high school teachers, and junior college teachers. These three groups were requested to rate the partial list of competencies as being Crucial (C), Highly Desirable (H), Desirable but not absolutely necessary (D), Nonimportant (N), Incorrectly stated--needs revision (I), and Do not use--concept inappropriate (X). In addition, participants were asked to revise and expand upon this partial list of competencies.

#### DEVELOPMENT AND PRESENTATION OF QUESTIONNAIRE II

Respondent ratings to Questionnaire I were tallied and analyzed by the researcher. Competencies receiving a number of Nonimportant (N), Incorrectly stated--needs revision (I), and Do not use--concept inappropriate (X) ratings were re-evaluated

and, in some instances, reworded. None of the competencies were eliminated as, in every instance, the Crucial (C), Highly Desirable (H), and Desirable (D) ratings outnumbered the Nonimportant (N), Incorrectly stated--needs revision (I), and Do not use--concept inappropriate (S) ratings. The questionnaire was then methodically revamped to reflect the opinions of the respondents.

The revised and expanded questionnaire (Appendix I, page 174) contained 183 competencies. The additional competencies added by respondents are indicated by the sign (#) in Appendix I, page 174). Identical questionnaires were sent to authorities, high school teachers, and junior college teachers.

Questionnaire II asked that the participants rate the revised and expanded list of competencies again using the coding Crucial (C), Highly Desirable (H), Desirable but not absolutely necessary (D), Nonimportant (N), Incorrectly stated--needs revision (I), and Do not use--concept inappropriate (X). The coding was repeated twice for each competency.

High school teachers were asked to indicate their ranking of each competency using the coding marked (S). Junior college teachers were asked to indicate their rating of each competency using the coding marked (J). Authorities were asked to respond to the competencies by indicating their rating of each competency for high school teachers in the space marked (S) and their rating of the competency for junior college teachers in the space marked (J). The ratings given the competencies by authorities could show variance between levels. For example, a competency could be rated by authorities as Crucial (C) at the high school level and Desirable (D) at the junior college level. Responses to this questionnaire were tallied and a modal consensus was determined for each competency statement.

#### PRESENTATION AND INTERPRETATION OF QUESTIONNAIRE III

Questionnaire III contained competencies identical to those presented in Questionnaire II. A black square (■) placed on the rating indicated the modal consensus. Until this point, each group had received identical questionnaires. With the recording of the

modes for each group, variance between groups occurred. A red circle ( O ) indicated the selection the participant had made in Questionnaire II. Participants were asked to review their responses in relation to the modal consensus and either join the modal consensus or state briefly why they chose to remain outside the modal consensus.

The data from the two groups will be examined in this section. Each category of the competency areas will be presented using a table to show chi-square values and a comparison of the percentage of each response from the authorities, junior college teachers, and high school teachers in selecting Crucial (C), Highly Desirable (H), Desirable but not absolutely necessary (D), Nonimportant (N), Reword competency (I), and Do not use (X), for each competency. Comparisons will be made for the responses of authorities and junior college teachers, authorities and high school teachers, and high school and junior college teachers.

#### Responses of Authorities and Junior College Teachers

A description follows of the responses of authorities and junior college teachers to competencies contained in Questionnaire III.

Appendix M, page 212, contains a complete listing of those competencies rated crucial and highly desirable by a modal consensus of authorities and junior college teachers. A list of those competencies rated crucial and highly desirable by 50 percent or more of either group is also included in Appendix M. A complete listing of those competencies found to be significantly different in the reporting of the different groups is shown in Appendix P, page 249.

### Planning

Included in the category of Planning are selecting aims, objectives, goals; collaborating with others in planning, developing classroom procedures; selecting or developing materials and activities; and organizing students. Questionnaire III sent to the three groups contained 37 competency statements in the Planning category.

Chi-square values and percentages of responses to Planning competencies are included in Table 8.

Only one competency was rated by the consensus of both groups as crucial: Competency No. 16, "Knowledge of the end results--what the student is expected to accomplish by the completion of the course."

Table 8

Planning Competencies as Indicated by Authorities and Junior College  
Teachers, Including Degrees of Freedom, Chi-Square,  
and Percentages of Responses

| No. | DF | Chi-Square | Authorities (31) |    |    |    |    |    | Junior College Teachers (44) |    |    |    |    |    |
|-----|----|------------|------------------|----|----|----|----|----|------------------------------|----|----|----|----|----|
|     |    |            | C                | H  | D  | N  | I  | X  | C                            | H  | D  | N  | I  | X  |
| 1   | 3  | .67        | 10               | 68 | 22 | -- | -- | -- | 7                            | 57 | 34 | 2  | -- | -- |
| 2   | 2  | .59        | 27               | 73 | -- | -- | -- | -- | 37                           | 61 | 2  | -- | -- | -- |
| 3   | 4  | 3.66       | 4                | 41 | 52 | 3  | -- | -- | 16                           | 54 | 28 | -- | 2  | -- |
| 4   | 5  | .73        | 19               | 59 | 13 | 3  | 3  | 3  | 23                           | 49 | 23 | 3  | 2  | -- |
| 5*  | 2  | 7.71       | 29               | 68 | 3  | -- | -- | -- | 18                           | 54 | 28 | -- | -- | -- |
| 6   | 3  | .89        | 29               | 58 | 10 | 3  | -- | -- | 23                           | 56 | 21 | -- | -- | -- |
| 7*  | 2  | 14.46      | 68               | 16 | 16 | -- | -- | -- | 24                           | 48 | 28 | -- | -- | -- |
| 8*  | 3  | 14.85      | 77               | 17 | 3  | -- | 3  | -- | 30                           | 61 | 9  | -- | -- | -- |
| 9   | 5  | .20        | --               | 19 | 52 | 23 | 3  | 3  | 2                            | 26 | 44 | 23 | 5  | -- |
| 10  | 5  | .19        | 3                | 24 | 48 | 19 | 3  | 3  | 2                            | 30 | 44 | 19 | 5  | -- |
| 11* | 2  | 7.17       | 65               | 15 | 20 | -- | -- | -- | 36                           | 43 | 21 | -- | -- | -- |
| 12  | 3  | 1.16       | 16               | 68 | 16 | -- | -- | -- | 12                           | 56 | 28 | 4  | -- | -- |
| 13  | 3  | 2.50       | 19               | 68 | 13 | -- | -- | -- | 16                           | 63 | 19 | 2  | -- | -- |
| 14  | 4  | 1.58       | 3                | 39 | 48 | 10 | -- | -- | 5                            | 36 | 41 | 9  | 4  | -- |
| 15  | 3  | 6.31       | 32               | 52 | 13 | -- | 3  | -- | 14                           | 74 | 23 | -- | -- | -- |
| 16  | 3  | 1.06       | 67               | 30 | -- | -- | 3  | -- | 56                           | 37 | 7  | -- | -- | -- |
| 17  | 3  | 6.10       | 6                | 77 | 13 | 4  | -- | -- | 14                           | 43 | 33 | 10 | -- | -- |

\*Significant Difference at the .05 Level

Degrees of Freedom

1=3.841      3=7.815      5=11.070

2=5.991      4=9.488

Table 8 continued

| No. | DF | Chi-Square | Authorities (31) |    |    |    |    |    | Junior College Teachers (44) |    |    |    |    |    |
|-----|----|------------|------------------|----|----|----|----|----|------------------------------|----|----|----|----|----|
|     |    |            | C                | H  | D  | N  | I  | X  | C                            | H  | D  | N  | I  | X  |
| 18  | 4  | 2.03       | 13               | 65 | 16 | 3  | 3  | -- | 12                           | 47 | 31 | 10 | -- | -- |
| 19  | 2  | 5.67       | 65               | 29 | 6  | -- | -- | -- | 33                           | 53 | 14 | -- | -- | -- |
| 20  | 3  | 5.39       | 16               | 55 | 29 | -- | -- | -- | 5                            | 35 | 58 | 2  | -- | -- |
| 21  | 3  | 1.25       | 16               | 55 | 29 | -- | -- | -- | 7                            | 49 | 39 | 5  | -- | -- |
| 22  | 4  | .03        | 23               | 57 | 17 | -- | 3  | -- | 24                           | 55 | 19 | 2  | -- | -- |
| 23  | 3  | 2.96       | 23               | 61 | 13 | 3  | -- | -- | 12                           | 51 | 21 | 16 | -- | -- |
| 24  | 5  | .20        | 6                | 26 | 52 | 13 | 3  | -- | 2                            | 26 | 51 | 19 | -- | 2  |
| 25  | 4  | 4.82       | 23               | 35 | 38 | -- | 4  | -- | 28                           | 56 | 14 | 2  | -- | -- |
| 26  | 2  | .00        | 19               | 68 | 13 | -- | -- | -- | 16                           | 70 | 14 | -- | -- | -- |
| 27  | 3  | 2.80       | 6                | 77 | 13 | -- | 3  | -- | 13                           | 57 | 30 | -- | -- | -- |
| 28  | 3  | .60        | 19               | 58 | 23 | -- | -- | -- | 28                           | 56 | 14 | 2  | -- | -- |
| 29  | 5  | 3.79       | 4                | 7  | 46 | 43 | -- | -- | 5                            | 19 | 50 | 19 | 5  | 2  |
| 30  | 4  | 9.31       | 19               | 26 | 43 | 6  | 6  | -- | 12                           | 66 | 15 | 5  | 2  | -- |
| 31  | 3  | 6.56       | 29               | 65 | 6  | -- | -- | -- | 30                           | 56 | 9  | -- | -- | -- |
| 32  | 3  | .12        | 35               | 49 | 13 | 3  | -- | -- | 35                           | 47 | 18 | -- | -- | -- |
| 33  | 3  | 2.90       | 3                | 42 | 52 | 3  | -- | -- | 2                            | 21 | 72 | 5  | -- | -- |
| 34  | 4  | .55        | 32               | 52 | 6  | 6  | 3  | -- | 44                           | 44 | 6  | 3  | 3  | -- |
| 35  | 3  | 2.58       | 6                | 13 | 61 | 19 | -- | -- | 5                            | 32 | 51 | 12 | -- | -- |
| 36  | 3  | .93        | 13               | 13 | 58 | 16 | -- | -- | 9                            | 26 | 53 | 12 | -- | -- |
| 37* | 4  | 9.60       | 71               | 19 | 4  | -- | 6  | -- | 39                           | 48 | 7  | -- | 6  | -- |

\*Significant Difference at the .05 Level

Degrees of Freedom

1=3.841    3=7.815    5=11.070

2=5.991    4=9.488

The following competencies in Planning were rated as highly desirable by both groups:

1. Relationship of the data processing course to other courses and the total school program.
2. Relationship of the data processing course to positions in industry and business.
4. Preparation of a syllabus for the teacher's use.
5. Preparation of supplementary instructional materials.
6. Preparation of a syllabus for the data processing course.
12. Development of instructional strategies appropriate to students' stated objectives and students' learning styles.
13. Recognition of the need for strategies appropriate to students' stated objectives and students' learning styles.
15. Provision for various teaching methods using creativity and imagination.
17. Development of behavioral objectives.
18. Use of behavioral objectives.
21. Selection of supplementary materials.
22. Establishment of grading standards.
23. Establishment of grading standards based on students' competencies and established objectives.
26. Collaboration with other data processing teachers, business education teachers, and administrators in planning.
27. Planning course outline using long-range objectives.

28. Knowledge of content resulting from practical business experience in positions involving data processing.
31. Provision for exercises using data processing equipment.
32. Provision for "hands-on" experience if equipment is available.

While Competency No. 34, "Provision for exercises using computer program assignments," was rated highly desirable by 52 percent of the authorities and 44 percent of the teacher group, a bimodal consensus was reported in the teacher group. Forty-four percent of the teachers also rated the competency as crucial.

#### Administration

Administration includes arranging physical environment, maintaining procedures and routines, maintaining records, and organizing materials and equipment. Questionnaire III sent to the three groups contained nine competencies under the Administration category.

Responses to competencies in the Administration category are indicated in Table 9. Also shown in this table are degrees of freedom, chi-square values, and percentages of responses obtained from authorities and junior college teachers in the Administration area.

Table 9

Administration Competencies as Indicated by Authorities and  
Junior College Teachers, Including Degrees of Freedom,  
Chi-Square, and Percentages of Responses

| No. | DF | Chi-Square | Authorities (31) |    |    |    |    |   | Junior College Teachers (44) |    |    |    |    |    |
|-----|----|------------|------------------|----|----|----|----|---|------------------------------|----|----|----|----|----|
|     |    |            | C                | H  | D  | N  | I  | X | C                            | H  | D  | N  | I  | X  |
| 1   | 4  | 1.29       | 3                | 61 | 23 | 10 | -- | 3 | 7                            | 49 | 37 | 5  | -- | 2  |
| 2   | 5  | 4.64       | 10               | 61 | 20 | 3  | 3  | 3 | 7                            | 42 | 51 | -- | -- | -- |
| 3   | 3  | 1.77       | 19               | 54 | 22 | -- | -- | 5 | 14                           | 70 | 16 | -- | -- | -- |
| 4   | 5  | 1.57       | 13               | 65 | 16 | -- | 3  | 3 | 12                           | 53 | 33 | 2  | -- | -- |
| 5   | 4  | 8.63       | 10               | 16 | 65 | 6  | -- | 3 | 12                           | 49 | 30 | 9  | -- | -- |
| 6*  | 4  | 9.97       | 29               | 13 | 48 | 6  | -- | 3 | 16                           | 53 | 26 | 5  | -- | -- |
| 7   | 5  | 4.92       | 6                | 19 | 62 | 7  | 3  | 3 | 7                            | 44 | 35 | 12 | -- | -- |
| 8   | 4  | .29        | 6                | 61 | 29 | -- | -- | 3 | 7                            | 60 | 28 | 5  | -- | -- |
| 9   | 5  | 2.39       | 5                | 29 | 33 | 19 | 5  | 9 | 14                           | 40 | 30 | 12 | 5  | -- |

\*Significant Difference at the .05 Level

1=3.841    3=7.815    5=11.070

2=5.991    4=9.488

None of the nine competencies in the Administration category were rated crucial by the two groups. However, four of the nine competencies were considered by both groups to be highly desirable. These were:

1. The ability to conduct conferences with parents, teachers, and students.
3. Organization of teaching equipment, materials, etc.
4. Establishment and maintenance of classroom procedures and routines.
8. Establishment of rapport with community organizations to facilitate field trips.

### Instruction

In this category are included structuring, motivating, and reinforcing students, providing for feedback, presenting information, and conducting learning activities. Using the Hebert model,<sup>60</sup> the competencies were divided into two areas--Content and Methodologies/Techniques. Questionnaire III sent to the three groups listed 49 competencies in the Content area of the Instruction category and 38 competencies in the Methodologies/Techniques area of the Instruction category.

Content. Chi-square values of the differences and similarities between the business data processing authorities and the junior college

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<sup>60</sup>Hebert, op. cit.

Table 10

Instruction (Content) Competencies as Indicated by Authorities and  
Junior College Teachers, Including Degrees of Freedom,  
Chi-Square, and Percentages of Responses

| No. | DF | Chi-Square | Authorities (31) |    |    |    |    |    | Junior College Teachers (44) |    |    |    |    |    |
|-----|----|------------|------------------|----|----|----|----|----|------------------------------|----|----|----|----|----|
|     |    |            | C                | H  | D  | N  | I  | X  | C                            | H  | D  | N  | I  | X  |
| 1   | 3  | 5.64       | 3                | 24 | 70 | 3  | -- | -- | 12                           | 49 | 40 | -- | -- | -- |
| 2*  | 2  | 11.13      | 93               | 7  | -- | -- | -- | -- | 52                           | 43 | 5  | -- | -- | -- |
| 3*  | 2  | 6.25       | 89               | 7  | -- | -- | 3  | -- | 63                           | 37 | -- | -- | -- | -- |
| 4*  | 3  | 14.23      | 70               | 20 | 3  | -- | 6  | -- | 28                           | 63 | 9  | -- | -- | -- |
| 5*  | 3  | 12.20      | 71               | 19 | -- | -- | 10 | -- | 36                           | 61 | 2  | -- | -- | -- |
| 6   | 4  | 8.19       | 15               | 49 | 22 | 7  | 7  | -- | 9                            | 26 | 63 | 2  | -- | -- |
| 7   | 3  | 2.78       | 41               | 49 | 7  | 3  | -- | -- | 30                           | 44 | 26 | -- | -- | -- |
| 8*  | 3  | 7.81       | 26               | 58 | 13 | 3  | -- | -- | 26                           | 51 | 23 | -- | -- | -- |
| 9   | 3  | .10        | 17               | 43 | 34 | 6  | -- | -- | 14                           | 45 | 38 | 2  | -- | -- |
| 10* | 4  | 11.28      | 10               | 66 | 7  | 3  | 14 | -- | 9                            | 35 | 47 | 5  | 5  | -- |
| 11  | 4  | 3.54       | 17               | 41 | 34 | -- | 7  | -- | 7                            | 37 | 40 | 14 | 2  | -- |
| 12* | 4  | 10.18      | 66               | 21 | 10 | -- | 3  | -- | 26                           | 56 | 16 | 2  | -- | -- |
| 13  | 5  | 6.81       | 3                | 10 | 19 | 61 | 3  | 3  | 9                            | 16 | 9  | 40 | 26 | -- |
| 14  | 3  | 1.90       | 3                | 16 | 78 | 3  | -- | -- | --                           | 33 | 60 | 7  | -- | -- |
| 15  | 3  | 2.12       | 16               | 61 | 19 | 3  | -- | -- | 19                           | 44 | 37 | -- | -- | -- |
| 16  | 3  | 2.42       | 74               | 16 | 6  | -- | 3  | -- | 57                           | 36 | 7  | -- | -- | -- |

\*Significant Difference at the .05 Level

1=3.841    3=7.815    5=11.070

2=5.991    4=9.488

Table 10 continued

| No.   | DF | Chi-Square | Authorities (31) |    |    |    |    |    | Junior College Teachers (44) |    |    |    |    |    |
|-------|----|------------|------------------|----|----|----|----|----|------------------------------|----|----|----|----|----|
|       |    |            | C                | H  | D  | N  | I  | X  | C                            | H  | D  | N  | I  | X  |
| 17*   | 4  | 19.00      | 10               | 70 | 10 | -- | 10 | -- | 12                           | 37 | 44 | 7  | -- | -- |
| 18    | 3  | 3.47       | 19               | 70 | 3  | -- | 8  | -- | 30                           | 53 | 16 | -- | -- | -- |
| 19    | 4  | 7.14       | 23               | 48 | 26 | -- | 3  | -- | 7                            | 53 | 37 | 2  | -- | -- |
| 20    | 3  | 2.58       | 17               | 60 | 17 | 7  | -- | -- | 12                           | 44 | 37 | 7  | -- | -- |
| 21    | 4  | .43        | 23               | 55 | 16 | 3  | 3  | -- | 23                           | 51 | 26 | -- | -- | -- |
| 22    | 3  | 1.64       | 17               | 27 | 57 | -- | -- | -- | 12                           | 19 | 60 | 9  | -- | -- |
| 23    | 3  | 7.11       | 16               | 68 | 10 | 6  | -- | -- | 21                           | 37 | 37 | 5  | -- | -- |
| 24    | 5  | 4.09       | 3                | 37 | 37 | 11 | 6  | 6  | 9                            | 23 | 58 | 9  | -- | -- |
| 25    | 5  | 3.99       | 11               | 12 | 58 | 12 | 4  | 3  | 19                           | 36 | 38 | 7  | -- | -- |
| 26    | 3  | 1.83       | 13               | 29 | 55 | 3  | -- | -- | 7                            | 47 | 40 | 7  | -- | -- |
| 27    | 5  | 4.10       | 12               | 50 | 20 | 11 | 3  | 3  | 10                           | 33 | 50 | 7  | -- | -- |
| 28    | 2  | 1.23       | 26               | 45 | 29 | -- | -- | -- | 37                           | 42 | 21 | -- | -- | -- |
| 29    | 3  | .97        | 7                | 19 | 74 | -- | -- | -- | 2                            | 24 | 67 | 7  | -- | -- |
| 30*   | 4  | 12.56      | 50               | 10 | 30 | 6  | 4  | -- | 16                           | 49 | 28 | 5  | 2  | -- |
| 31.1  | 3  | 3.76       | 55               | 24 | 17 | -- | 4  | -- | 35                           | 51 | 14 | -- | -- | -- |
| 31.2  | 4  | .34        | 19               | 48 | 26 | 3  | 4  | -- | 28                           | 51 | 21 | -- | -- | -- |
| 31.3* | 3  | 8.77       | 8                | 48 | 28 | 16 | -- | -- | 5                            | 20 | 58 | 18 | -- | -- |
| 31.4  | 4  | 1.41       | 3                | 16 | 62 | 16 | 3  | -- | 12                           | 19 | 45 | 21 | 2  | -- |
| 31.5  | 4  | 3.15       | 10               | 19 | 55 | 13 | 3  | -- | 28                           | 26 | 37 | 9  | -- | -- |
| 31.6  | 4  | 1.42       | 3                | 26 | 48 | 19 | 3  | -- | 5                            | 14 | 65 | 16 | -- | -- |
| 31.7  | 4  | .20        | 13               | 16 | 52 | 16 | 3  | -- | 12                           | 23 | 51 | 14 | -- | -- |

\*Significant Difference at the .05 Level

1=3.841    3=7.815    5=11.070

2=5.991    4=9.488

Table 10 continued

| No.   | DF | Chi-Square | Authorities (31) |    |    |    |    |    | Junior College Teachers (44) |    |    |    |    |    |
|-------|----|------------|------------------|----|----|----|----|----|------------------------------|----|----|----|----|----|
|       |    |            | C                | H  | D  | N  | I  | X  | C                            | H  | D  | N  | I  | X  |
| 31.8  | 4  | 2.67       | 10               | 13 | 55 | 19 | 3  | -- | 14                           | 28 | 51 | 7  | -- | -- |
| 31.9  | 5  | 2.47       | 6                | 14 | 43 | 16 | 20 | -- | 10                           | 18 | 43 | 20 | 5  | 5  |
| 31.10 | 4  | .63        | --               | -- | 30 | 67 | 3  | -- | --                           | 5  | 37 | 53 | 2  | 2  |
| 31.11 | 4  | .52        | --               | 11 | 56 | 26 | 4  | 3  | --                           | 5  | 58 | 35 | 2  | -- |
| 31.12 | 3  | .53        | --               | 4  | 56 | 37 | 4  | -- | --                           | 5  | 44 | 49 | 2  | -- |
| 31.13 | 4  | 1.14       | 3                | 10 | 61 | 19 | 6  | -- | 7                            | 21 | 49 | 16 | 7  | -- |
| 32    | 5  | 3.54       | 6                | 6  | 13 | 10 | 58 | 6  | 17                           | 14 | 10 | 10 | 36 | 14 |
| 33    | 3  | 3.07       | 55               | 35 | 6  | -- | 3  | -- | 33                           | 51 | 16 | -- | -- | -- |
| 34    | 2  | 1.04       | 25               | 58 | 16 | -- | -- | -- | 26                           | 49 | 26 | -- | -- | -- |
| 35    | 3  | .05        | 61               | 32 | 4  | -- | 3  | -- | 58                           | 37 | 5  | -- | -- | -- |
| 36    | 4  | .21        | 3                | 14 | 58 | 25 | -- | -- | --                           | 16 | 63 | 19 | 2  | -- |
| 37    | 3  | 1.24       | 6                | 3  | 74 | 16 | -- | -- | --                           | 9  | 70 | 21 | -- | -- |

\*Significant Difference at the .05 Level

Degrees of Freedom

1=3.841    3=7.815    5=11.070

2=5.991    4=9.488

teachers in addition to the percentages of responses for the two groups are given in Table 10.

Four competencies were rated as crucial and twelve were rated as highly desirable by authorities and junior college teachers.

The competencies rated crucial were: Competency No. 2, "Knowledge of data processing terminology"; Competency No. 3, "Knowledge and application of data processing functions"; Competency No. 16, "Knowledge of the electronic computer"; and Competency No. 35, "Ability to flow chart."

Those competencies receiving highly desirable ratings follow:

7. Knowledge of use of punched cards.
8. Knowledge of record planning and layout for various mediums.
9. Ability to keypunch information in cards.
15. Knowledge of data-base concepts.
18. Knowledge about information storage and retrieval.
19. Knowledge of teleprocessing concepts.
20. Knowledge of multiprogram concepts.
21. Knowledge of documentation standards.
23. Knowledge of interaction of systems and systems analysis.
28. Knowledge of computer execution of a program.
- 31 .2. Knowledge of computer languages: Fortran.
34. Knowledge of report design.

Methodologies/Techniques. Competencies in the Instruction--Methodologies/Techniques category are indicated in Table 11. In addition, this table also reflects the percentages of responses obtained from business data processing authorities and junior college teachers in the Instruction--Methodologies/Techniques area.

The following competencies were ranked by the consensus of both groups as crucial: Competency No. 2.9, "Ability to demonstrate the computer"; and Competency No. 7, "Ability to demonstrate flow charting."

A bimodal response was recorded for junior college teachers on Competency No. 1.5, "Application of psychological principles of learning regarding whole vs. part learning." Forty-five percent of the junior college teachers rated the competency highly desirable, and 45 percent rated it desirable. However, 52 percent of the authority group believed the competency to be highly desirable.

The following competencies in the Instruction--Methodologies/Techniques category were rated as highly desirable by both groups:

1. Application of psychological principles of learning regarding:
  - 1.2 Motivation
  - 1.3 Practice
  - 1.6 Transfer of learning

Table 11

Instruction (Methodologies/Techniques) Competencies as Indicated  
by Authorities and Junior College Teachers, Including  
Degrees of Freedom, Chi-Square, and  
Percentages of Responses

| No.  | DF | Chi-Square | Authorities (31) |    |    |    |    |    | Junior College Teachers (44) |    |    |    |    |    |
|------|----|------------|------------------|----|----|----|----|----|------------------------------|----|----|----|----|----|
|      |    |            | C                | H  | D  | N  | I  | X  | C                            | H  | D  | N  | I  | X  |
| 1.1* | 4  | 27.34      | 45               | 16 | 26 | -- | 6  | 6  | --                           | 63 | 37 | -- | -- | -- |
| 1.2  | 4  | 6.66       | 29               | 43 | 19 | -- | 6  | 3  | 7                            | 65 | 28 | -- | -- | -- |
| 1.3  | 5  | 9.68       | 19               | 52 | 19 | -- | 6  | 3  | 21                           | 56 | 2  | 21 | -- | -- |
| 1.4* | 3  | 8.44       | 10               | 10 | 77 | 3  | -- | -- | 2                            | 37 | 56 | 5  | -- | -- |
| 1.5  | 4  | 8.31       | 3                | 52 | 23 | -- | 19 | 3  | 10                           | 45 | 45 | -- | -- | -- |
| 1.6  | 5  | 3.41       | 16               | 47 | 17 | 3  | 13 | 3  | 12                           | 50 | 36 | -- | 2  | -- |
| 2.1  | 5  | .08        | 6                | 23 | 52 | 13 | 3  | 3  | 9                            | 28 | 49 | 9  | -- | 5  |
| 2.2  | 5  | 3.46       | 13               | 26 | 52 | 3  | 3  | 3  | 12                           | 40 | 30 | 14 | -- | 5  |
| 2.3  | 5  | 1.03       | 6                | 29 | 36 | 19 | 3  | 6  | 7                            | 21 | 52 | 14 | -- | 5  |
| 2.4* | 3  | 12.47      | 65               | 16 | 16 | -- | 3  | -- | 23                           | 53 | 23 | -- | -- | -- |
| 2.5  | 5  | .24        | 7                | 26 | 41 | 15 | 4  | 7  | 7                            | 35 | 42 | 12 | -- | 5  |
| 2.6  | 5  | 5.48       | 10               | 26 | 23 | 32 | 3  | 6  | 7                            | 28 | 49 | 12 | -- | 5  |
| 2.7  | 5  | .35        | 6                | 26 | 35 | 23 | 3  | 6  | 7                            | 21 | 47 | 21 | -- | 5  |
| 2.8* | 3  | 9.65       | 39               | 45 | 13 | -- | 3  | -- | 16                           | 33 | 51 | -- | -- | -- |
| 2.9  | 4  | .00        | 48               | 36 | 10 | 3  | 3  | -- | 51                           | 35 | 7  | 5  | 2  | -- |
| 3    | 3  | .42        | 30               | 57 | 10 | 3  | -- | -- | 21                           | 65 | 14 | -- | -- | -- |

\*Significant Difference at the .05 Level

1=3.841    3=7.815    5=11.070

2=5.991    4=9.488

Table 11 continued

| No.   | DF | Chi-Square | Authorities (31) |    |    |    |    |    | Junior College Teachers (44) |    |    |    |    |    |
|-------|----|------------|------------------|----|----|----|----|----|------------------------------|----|----|----|----|----|
|       |    |            | C                | H  | D  | N  | I  | X  | C                            | H  | D  | N  | I  | X  |
| 4.1   | 3  | 6.22       | 42               | 35 | 13 | 10 | -- | -- | 30                           | 51 | 19 | -- | -- | -- |
| 4.2*  | 4  | 12.26      | 19               | 23 | 45 | 10 | 3  | -- | 32                           | 55 | 14 | -- | -- | -- |
| 4.3   | 4  | 1.23       | 6                | 19 | 48 | 23 | 4  | -- | 7                            | 30 | 51 | 12 | -- | -- |
| 4.4*  | 4  | 13.90      | 3                | -- | 32 | 61 | 3  | -- | 12                           | 14 | 55 | 17 | 2  | -- |
| 4.5*  | 4  | 10.75      | 3                | 16 | 29 | 45 | 7  | -- | 16                           | 30 | 42 | 17 | -- | -- |
| 4.6   | 4  | 6.82       | 6                | 3  | 39 | 48 | 4  | -- | 5                            | 12 | 65 | 19 | -- | -- |
| 4.7   | 3  | 2.80       | 7                | 16 | 55 | 22 | -- | -- | 16                           | 14 | 58 | 12 | -- | -- |
| 4.8   | 5  | 8.50       | 7                | 14 | 52 | 19 | 4  | 4  | 14                           | 23 | 58 | 5  | -- | -- |
| 4.9*  | 5  | 11.31      | 6                | 10 | 10 | 48 | 23 | 3  | 15                           | 8  | 45 | 23 | 8  | 3  |
| 4.10  | 4  | 6.66       | --               | -- | 13 | 77 | 7  | 3  | --                           | 2  | 45 | 48 | 5  | -- |
| 4.11  | 4  | 6.26       | 3                | 3  | 16 | 68 | 10 | -- | --                           | 7  | 47 | 44 | 2  | -- |
| 4.12  | 3  | 7.74       | --               | 3  | 10 | 81 | 6  | -- | --                           | 5  | 40 | 53 | 2  | -- |
| 4.13* | 5  | 14.70      | 3                | 10 | 16 | 58 | 10 | 3  | 5                            | 12 | 58 | 23 | -- | 2  |
| 5     | 4  | .04        | 23               | 55 | 16 | 3  | 3  | -- | 21                           | 56 | 21 | -- | 2  | -- |
| 6     | 2  | 1.08       | 16               | 68 | 16 | -- | -- | -- | 23                           | 53 | 21 | 2  | -- | -- |
| 7     | 2  | 2.98       | 71               | 23 | 6  | -- | -- | -- | 53                           | 42 | 5  | -- | -- | -- |
| 8*    | 4  | 13.74      | 52               | 26 | 13 | 6  | 3  | -- | 16                           | 72 | 12 | -- | -- | -- |
| 9     | 4  | 1.54       | 10               | 68 | 13 | 6  | -- | 3  | 16                           | 58 | 23 | -- | -- | 2  |
| 10*   | 3  | 10.47      | 13               | 23 | 55 | 10 | -- | -- | 26                           | 49 | 26 | -- | -- | -- |
| 11    | 5  | 7.20       | 13               | 3  | 55 | 23 | 3  | 3  | 9                            | 30 | 47 | 12 | -- | 2  |
| 12    | 4  | 4.07       | 16               | 62 | 13 | 3  | -- | 6  | 14                           | 47 | 40 | -- | -- | -- |
| 13    | 4  | 1.16       | 3                | 23 | 52 | 16 | -- | 6  | 7                            | 28 | 51 | 12 | -- | 2  |

\*Significant Difference at the .05 Level

1=3.841    3=7.815    5=11.070

2=5.991    4=9.448

3. Ability to enrich classroom presentation with cards, tapes, etc. used in actual business practice.
5. Ability to demonstrate various input/output media.
6. Ability to present systems design for data processing application.
9. Ability to transfer unit-record concepts to computer concepts.
12. Ability to compare manual data handling to each of the functions of computer data handling.

### Communication

Communication competencies are those involving the operation of hardware (audio-visual equipment) and initiating and responding verbally and nonverbally. Sixteen competencies were listed in this category on Questionnaire III.

Chi-square values obtained for the significant differences between business data processing authorities and junior college teachers regarding Communication competencies and the percentages of responses obtained from both groups are given in Table 12.

The consensus of both groups rated the following competencies as crucial: Competency No. 4, "Provision for teacher-pupil interaction"; and Competency No. 8, "Ability to explain verbally."

The groups did not differ significantly in their responses to Competency No. 7, "Ability to use nonverbal communication," as both groups rated this competency highly desirable.

Table 12

Communication Competencies as Indicated by Authorities and  
Junior College Teachers, Including Degrees of Freedom,  
Chi-Square, and Percentages of Responses

| No. | DF | Chi-Square | Authorities (31) |    |    |    |    |   | Junior College Teachers (44) |    |    |    |    |    |
|-----|----|------------|------------------|----|----|----|----|---|------------------------------|----|----|----|----|----|
|     |    |            | C                | H  | D  | N  | I  | X | C                            | H  | D  | N  | I  | X  |
| 1*  | 3  | 16.51      | 73               | 17 | 7  | -- | -- | 3 | 28                           | 67 | 5  | -- | -- | -- |
| 2*  | 3  | 8.29       | 48               | 42 | 6  | -- | -- | 3 | 16                           | 77 | 7  | -- | -- | -- |
| 3.1 | 3  | 2.00       | 50               | 43 | 3  | -- | -- | 3 | 30                           | 61 | 9  | -- | -- | -- |
| 3.2 | 3  | 4.04       | 47               | 43 | 7  | -- | -- | 3 | 21                           | 65 | 14 | -- | -- | -- |
| 3.3 | 4  | .50        | 3                | 30 | 53 | 10 | -- | 3 | 2                            | 40 | 49 | 9  | -- | -- |
| 3.4 | 4  | 3.72       | 7                | 10 | 80 | -- | -- | 3 | 2                            | 30 | 58 | 9  | -- | -- |
| 3.5 | 5  | 3.49       | 7                | 17 | 67 | 7  | -- | 3 | 5                            | 33 | 42 | 9  | 12 | -- |
| 3.6 | 4  | .15        | 10               | 30 | 53 | 3  | -- | 3 | 8                            | 26 | 63 | 2  | -- | -- |
| 3.7 | 4  | .14        | 7                | 20 | 67 | 3  | -- | 3 | 5                            | 19 | 74 | 2  | -- | -- |
| 3.8 | 4  | 2.49       | 6                | 6  | 74 | 10 | -- | 3 | 5                            | 14 | 77 | 5  | -- | -- |
| 3.9 | 5  | 2.16       | 13               | 27 | 50 | 3  | 3  | 3 | 2                            | 23 | 63 | 12 | -- | -- |
| 4   | 3  | 5.18       | 73               | 13 | 10 | -- | -- | 3 | 42                           | 30 | 26 | 2  | -- | -- |
| 5*  | 3  | 8.13       | 70               | 20 | 7  | -- | -- | 3 | 33                           | 51 | 16 | -- | -- | -- |
| 6*  | 4  | 14.27      | 55               | 26 | 13 | -- | 3  | 3 | 12                           | 58 | 26 | 2  | 2  | -- |
| 7   | 3  | 1.28       | 14               | 69 | 14 | -- | -- | 3 | 9                            | 58 | 28 | 3  | 2  | -- |
| 8   | 3  | .92        | 83               | 10 | 3  | -- | -- | 3 | 72                           | 21 | 7  | -- | -- | -- |

\*Significant Difference at the .05 Level

1=3.841    3=7.815    5=11.070

2=5.991    4=9.488

### Evaluation

Included in this category are selecting and assessing instruments, diagnosing student difficulties or abilities, and involving the students in self-evaluation. Questionnaire III contained eight competencies in the Evaluation category.

Chi-square values obtained for differences in responses between business data processing authorities and junior college teachers as well as percentages of responses obtained from the two groups regarding Evaluation competencies are shown in Table 13.

None of the eight Evaluation competencies were rated crucial by the two groups. However, six of the eight competencies were considered highly desirable by authorities and junior college teachers alike. They were:

1. Selection of valid and reliable measurement techniques.
2. Construction of valid and reliable measurement techniques.
3. Use of pretest and posttest when applicable.
4. Self-evaluation of teacher techniques and methods for self-improvement purposes.
5. Student evaluation of teacher techniques and methods for purposes of teacher improvement.
6. Use of student self-evaluation of his learning whenever feasible.

Significant difference was found in the reporting of the two groups on three competencies.

Table 13

Evaluation Competencies as Indicated by Authorities and Junior  
College Teachers, Including Degrees of Freedom,  
Chi-Square, and Percentages of Responses

| No. | DF | Chi-Square | Authorities (31) |    |    |    |    |    | Junior College Teachers (44) |    |    |    |    |    |
|-----|----|------------|------------------|----|----|----|----|----|------------------------------|----|----|----|----|----|
|     |    |            | C                | H  | D  | N  | I  | X  | C                            | H  | D  | N  | I  | X  |
| 1*  | 4  | 16.02      | 40               | 57 | -- | -- | -- | 3  | 3                            | 64 | 30 | 3  | -- | -- |
| 2   | 4  | 5.69       | 27               | 67 | 3  | -- | -- | 3  | 23                           | 47 | 28 | 2  | -- | -- |
| 3   | 4  | 1.15       | 13               | 52 | 26 | 3  | -- | 6  | 14                           | 47 | 35 | 5  | -- | -- |
| 4   | 4  | 2.76       | 33               | 47 | 13 | 3  | -- | 3  | 30                           | 67 | 2  | -- | -- | -- |
| 5   | 4  | .15        | 20               | 49 | 24 | 3  | -- | 4  | 23                           | 56 | 21 | -- | -- | -- |
| 6   | 4  | 1.54       | 7                | 73 | 14 | 3  | -- | 3  | 14                           | 58 | 26 | 2  | -- | -- |
| 7*  | 2  | 17.06      | 76               | 16 | 8  | -- | -- | -- | 27                           | 73 | -- | -- | -- | -- |
| 8*  | 3  | 16.49      | 70               | 20 | 7  | -- | 3  | -- | 21                           | 69 | 10 | -- | -- | -- |

\*Significant Difference at the .05 Level

1=3.841    3=7.815    5=11.070

2=5.991    4=9.488

### Developing Pupil-Self

Included in this category are developing pupil-self concept, social interaction skills, learning-to-learn skills, and acceptance of responsibility. This general category is included in this study as it is a part of the Dodl categories<sup>61</sup> and because the introductory data processing teacher has the opportunity to develop pupil-self concept.

Competencies in the Developing Pupil-Self category are indicated in Table 14. In addition, this table also shows the percentages of responses obtained from business data processing authorities and junior college teachers in the Developing Pupil-Self area.

Only Competency No. 12, "Development of ability in student to follow instructions," was considered crucial by both groups. Two of the fourteen competencies in the Developing Pupil-Self category were found to be significantly different in the reporting of the authority and junior college teacher groups.

The following competencies were rated highly desirable by a consensus of the two groups: Competency No. 1, "Assisting student in accepting responsibility of reaching his goals"; Competency No. 3, "Development of ability in student to work under pressure"; and

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<sup>61</sup>Dodl, op. cit.

Table 14

Developing Pupil-Self Competencies as Indicated by Authorities and  
Junior College Teachers, Including Degrees of Freedom,  
Chi-Square, and Percentages of Responses

| No. | DF | Chi-Square | Authorities (31) |    |    |    |    |    | Junior College Teachers (44) |    |    |    |    |    |
|-----|----|------------|------------------|----|----|----|----|----|------------------------------|----|----|----|----|----|
|     |    |            | C                | H  | D  | N  | I  | X  | C                            | H  | D  | N  | I  | X  |
| 1   | 4  | .59        | 24               | 62 | 10 | -- | -- | 4  | 16                           | 63 | 19 | -- | 2  | -- |
| 2   | 4  | 7.68       | 62               | 25 | 7  | -- | 3  | 3  | 9                            | 67 | 23 | -- | -- | -- |
| 3   | 5  | .33        | 23               | 54 | 14 | 3  | 3  | 3  | 19                           | 63 | 19 | -- | -- | -- |
| 4   | 3  | 7.58       | 67               | 13 | 17 | -- | -- | 3  | 39                           | 48 | 14 | -- | -- | -- |
| 5*  | 3  | 10.75      | 68               | 21 | 7  | -- | -- | 4  | 28                           | 63 | 9  | -- | -- | -- |
| 6   | 4  | .41        | 23               | 58 | 13 | 3  | -- | 3  | 16                           | 67 | 16 | -- | -- | -- |
| 7   | 4  | 5.60       | 10               | 28 | 48 | 10 | -- | 4  | --                           | 44 | 56 | -- | -- | -- |
| 8   | 5  | 9.49       | 3                | 43 | 27 | 17 | 3  | 7  | --                           | 21 | 70 | 7  | 2  | -- |
| 9   | 5  | 1.33       | 3                | 30 | 50 | 10 | 4  | 3  | --                           | 30 | 40 | 19 | 11 | -- |
| 10* | 4  | 13.59      | 60               | 13 | 10 | 13 | -- | 3  | 28                           | 42 | 30 | -- | -- | -- |
| 11  | 4  | .37        | 29               | 46 | 18 | 4  | -- | 3  | 23                           | 58 | 19 | -- | -- | -- |
| 12  | 2  | 1.48       | 74               | 16 | 10 | -- | -- | -- | 60                           | 23 | 16 | -- | -- | -- |
| 13  | 2  | 4.20       | 60               | 20 | 20 | -- | -- | -- | 37                           | 40 | 23 | -- | -- | -- |
| 14  | 5  | 10.76      | 50               | 10 | 25 | 7  | 4  | 4  | 24                           | 56 | 17 | 2  | -- | -- |

\*Significant Difference at the .05 Level

1=3.841    3=7.815    5=11.070

2=5.991    4=9.488

Competency No. 6, "Guidance regarding data processing as a vocational possibility, or work with counselor to provide services"; and Competency No. 11, "Development of ability in student to persevere.

### Personal Attributes

The Personal Attributes category includes accepting self, evaluating and improving self, planning for one's self improvement, and solving problems. The area also includes interacting with others--both students and peers. Questionnaire III contained thirteen competencies in the Personal Attributes area.

Table 15 shows a comparison of responses by business education authorities and junior college teachers on Personal Attributes competencies including chi-square values and percentages of responses.

Two of the thirteen Personal Attributes competencies were believed to be crucial by both groups of respondents. They were Competency No. 1, "Knowledge of the ethical procedures of a professional," and Competency No. 10, "Establishment of proper teacher behavior as an example to students." Competency No. 10 was rated crucial by 70 percent of the authority group. However, a bimodal response was recorded by the junior college teacher group. Forty percent of this group rated this competency crucial and 40 percent rated it highly desirable.

Table 15

Personal Attributes Competencies as Indicated by Authorities and  
Junior College Teachers, Including Degrees of Freedom,  
Chi-Square, and Percentages of Responses

| No. | DF | Chi-Square | Authorities (31) |    |    |    |    |    | Junior College Teachers (44) |    |    |    |    |    |
|-----|----|------------|------------------|----|----|----|----|----|------------------------------|----|----|----|----|----|
|     |    |            | C                | H  | D  | N  | I  | X  | C                            | H  | D  | N  | I  | X  |
| 1   | 2  | 1.42       | 60               | 23 | 17 | -- | -- | -- | 48                           | 40 | 12 | -- | -- | -- |
| 2   | 4  | 7.68       | 62               | 24 | 7  | -- | 4  | 3  | 30                           | 61 | 9  | -- | -- | -- |
| 3   | 4  | 6.55       | 45               | 35 | 19 | -- | -- | -- | 14                           | 49 | 37 | -- | -- | -- |
| 4*  | 3  | 9.18       | 65               | 25 | 10 | -- | -- | -- | 26                           | 58 | 16 | -- | -- | -- |
| 5   | 4  | .77        | 13               | 70 | 10 | 3  | -- | 4  | 12                           | 67 | 21 | -- | -- | -- |
| 6   | 3  | 5.20       | 59               | 21 | 14 | -- | -- | 6  | 35                           | 51 | 12 | -- | -- | 2  |
| 7   | 5  | 4.58       | 42               | 45 | 13 | -- | -- | -- | 19                           | 43 | 33 | 2  | 2  | -- |
| 8*  | 3  | 8.07       | 77               | 16 | 7  | -- | -- | -- | 40                           | 49 | 9  | 2  | -- | -- |
| 9*  | 4  | 15.74      | 61               | 20 | 13 | -- | 3  | 3  | 19                           | 67 | 14 | -- | -- | -- |
| 10  | 3  | 5.72       | 70               | 20 | 7  | -- | -- | 3  | 40                           | 40 | 20 | -- | -- | -- |
| 11  | 3  | 4.59       | 63               | 20 | 13 | -- | -- | 4  | 45                           | 48 | 5  | -- | -- | 2  |
| 12* | 5  | 12.42      | 58               | 16 | 16 | -- | 3  | 7  | 21                           | 57 | 14 | 5  | -- | 2  |
| 13* | 4  | 17.60      | 61               | 13 | 26 | -- | -- | -- | 21                           | 64 | 12 | 2  | -- | -- |

\*Significant Difference at the .05 Level

1=3.841    3=7.815    5=11.070

2=5.991    4=9.488

The following competencies were rated highly desirable by a consensus of authorities and junior college teachers: Competency No. 5, "Establishment of rapport with administrative and supervisory personnel," and Competency No. 7, "Establishing a need for creativity."

Five of the competencies were found to be significantly different in the reporting of the two groups.

#### Responses of Authorities and High School Teachers

A description follows of the responses of authorities and high school teachers to competencies contained in Questionnaire III. Appendix N, page 224, contains a complete listing of those competencies rated crucial and highly desirable by a modal consensus of authorities and high school teachers. A list of those competencies rated crucial and highly desirable by 50 percent or more of either group is also included in Appendix N, page 224. A complete listing of those competencies found to be significantly different in the reporting of the different groups is shown in Appendix P, page 249.

#### Planning

Included in the category of Planning are selecting aims, objectives, goals; collaborating with others in planning, developing classroom procedures; selecting or developing materials and

activities, and organizing students. Questionnaire III sent to the three groups contained 37 competencies under the Planning category.

Table 16 shows a comparison of responses by business education authorities and high school teachers on Planning competencies including chi-square values and percentages of responses.

Two competencies were rated by the consensus of both groups as crucial. They were: Competency No. 8, "Development of data processing concepts to be learned by the students"; and Competency No. 16, "Knowledge of the end results--what the student is expected to accomplish by the completion of the course."

The following competencies in Planning were rated as highly desirable by both groups.

2. Relationship of the data processing course to positions in industry and business.
4. Preparation of a syllabus for the teacher's use.
5. Preparation of supplementary instructional materials.
6. Preparation of a syllabus for the data processing course.

Table 16

Planning Competencies as Indicated by Authorities and High  
School Teachers, Including Degrees of Freedom,  
Chi-Square, and Percentages of Responses

| No. | DF | Chi-Square | Authorities (31) |    |    |    |    |    | High School Teachers (19) |    |    |    |    |    |
|-----|----|------------|------------------|----|----|----|----|----|---------------------------|----|----|----|----|----|
|     |    |            | C                | H  | D  | N  | I  | X  | C                         | H  | D  | N  | I  | X  |
| 1*  | 2  | 7.42       | 6                | 75 | 19 | -- | -- | -- | --                        | 37 | 63 | -- | -- | -- |
| 2   | 2  | .00        | 23               | 74 | 3  | -- | -- | -- | 26                        | 74 | -- | -- | -- | -- |
| 3*  | 3  | 12.70      | 4                | 37 | 55 | 4  | -- | -- | 11                        | 89 | -- | -- | -- | -- |
| 4   | 2  | 2.01       | 26               | 68 | 6  | -- | -- | -- | 21                        | 63 | 16 | -- | -- | -- |
| 5   | 2  | .22        | 26               | 68 | 6  | -- | -- | -- | 21                        | 79 | -- | -- | -- | -- |
| 6   | 2  | 1.61       | 29               | 58 | 13 | -- | -- | -- | 11                        | 61 | 28 | -- | -- | -- |
| 7*  | 2  | 8.54       | 68               | 16 | 16 | -- | -- | -- | 21                        | 53 | 26 | -- | -- | -- |
| 8   | 3  | .22        | 77               | 17 | 3  | -- | 3  | -- | 68                        | 21 | 11 | -- | -- | -- |
| 9   | 5  | 9.25       | --               | 13 | 55 | 26 | 3  | 3  | 5                         | 53 | 37 | -- | -- | 5  |
| 10  | 5  | 4.27       | 3                | 19 | 49 | 23 | 3  | 3  | 5                         | 42 | 47 | -- | -- | 5  |
| 11  | 2  | 4.23       | 65               | 19 | 16 | -- | -- | -- | 42                        | 53 | 5  | -- | -- | -- |
| 12  | 2  | 1.70       | 16               | 71 | 13 | -- | -- | -- | 37                        | 53 | 11 | -- | -- | -- |
| 13  | 3  | 3.74       | 19               | 71 | 10 | -- | -- | -- | 26                        | 68 | -- | 5  | -- | -- |
| 14  | 3  | 5.03       | 3                | 42 | 45 | 10 | -- | -- | 5                         | 79 | 16 | -- | -- | -- |
| 15  | 4  | 5.10       | 32               | 48 | 13 | -- | 3  | 3  | 11                        | 89 | -- | -- | -- | -- |
| 16  | 2  | .05        | 65               | 32 | -- | -- | 3  | -- | 74                        | 26 | -- | -- | -- | -- |
| 17  | 3  | 1.96       | 6                | 78 | 13 | 3  | -- | -- | 11                        | 53 | 32 | 5  | -- | -- |

\*Significant Difference at the .05 Level

1=3.941    3=7.815    4=11.070

2=5.991    4=9.448

Table 16 continued

| No. | DF | Chi-Square | Authorities (31) |    |    |    |    |    | High School Teachers (19) |    |    |    |    |    |
|-----|----|------------|------------------|----|----|----|----|----|---------------------------|----|----|----|----|----|
|     |    |            | C                | H  | D  | N  | I  | X  | C                         | H  | D  | N  | I  | X  |
| 18  | 4  | .94        | 10               | 68 | 16 | 3  | 3  | -- | 11                        | 56 | 33 | -- | -- | -- |
| 19  | 2  | 5.22       | 65               | 29 | 6  | -- | -- | -- | 26                        | 63 | 11 | -- | -- | -- |
| 20  | 2  | 3.46       | 19               | 36 | 45 | -- | -- | -- | 11                        | 68 | 21 | -- | -- | -- |
| 21  | 2  | 1.09       | 16               | 45 | 39 | -- | -- | -- | 16                        | 63 | 21 | -- | -- | -- |
| 22  | 4  | .09        | 27               | 53 | 13 | 3  | 3  | -- | 21                        | 58 | 21 | -- | -- | -- |
| 23  | 3  | .52        | 23               | 61 | 13 | 3  | -- | -- | 11                        | 74 | 16 | -- | -- | -- |
| 24  | 5  | 1.50       | 6                | 20 | 57 | 14 | 3  | -- | --                        | 26 | 68 | -- | -- | 5  |
| 25  | 4  | .57        | 16               | 55 | 23 | 3  | 3  | -- | 21                        | 68 | 11 | -- | -- | -- |
| 26  | 2  | .04        | 10               | 74 | 16 | -- | -- | -- | 16                        | 68 | 16 | -- | -- | -- |
| 27  | 3  | 1.51       | 6                | 61 | 29 | -- | 3  | -- | 16                        | 74 | 11 | -- | -- | -- |
| 28  | 2  | .05        | 16               | 55 | 29 | -- | -- | -- | 11                        | 63 | 26 | -- | -- | -- |
| 29  | 4  | 6.59       | 3                | 7  | 59 | 31 | -- | -- | --                        | 37 | 53 | 5  | -- | 5  |
| 30  | 4  | 3.80       | 14               | 26 | 48 | 6  | 6  | -- | --                        | 58 | 42 | -- | -- | -- |
| 31  | 3  | 5.87       | 32               | 61 | 7  | -- | -- | -- | 21                        | 47 | 26 | 5  | -- | -- |
| 32  | 3  | 3.71       | 48               | 33 | 16 | 3  | -- | -- | 37                        | 63 | -- | -- | -- | -- |
| 33  | 3  | .07        | 3                | 35 | 58 | 3  | -- | -- | --                        | 32 | 68 | -- | -- | -- |
| 34  | 4  | 2.66       | 23               | 56 | 9  | 9  | 3  | -- | 16                        | 53 | 32 | -- | -- | -- |
| 35  | 3  | 7.13       | 3                | 17 | 60 | 20 | -- | -- | 5                         | 58 | 32 | 5  | -- | -- |
| 36* | 3  | 20.14      | 13               | 13 | 55 | 19 | -- | -- | --                        | 84 | 11 | 5  | -- | -- |
| 37  | 3  | 6.73       | 71               | 19 | -- | -- | 10 | -- | 32                        | 58 | 5  | -- | 5  | -- |

\*Significant Difference at the .05 Level

1=3.941 3=7.815 4=11.070

2=5.991 4=9.448

12. Development of instructional strategies appropriate to students' stated objectives and students' learning styles.
13. Recognition of the need for strategies appropriate to students' stated objectives and students' learning styles.
15. Provision for various teaching methods using creativity and imagination.
17. Development of behavioral objectives.
18. Use of behavioral objectives.
21. Selection of supplementary materials.
22. Establishment of grading standards.
23. Establishment of grading standards based on students' competencies and established objectives.
25. Collaboration with businesses employing students for updating course content.
26. Collaboration with other data processing teachers, business education teachers, and administrators in planning.
27. Planning course outline using long-range objectives.
28. Knowledge of content resulting from practical business experience in positions involving data processing.
31. Provision for exercises using data processing equipment.
34. Provision for exercises using computer program assignments.

Of the 37 Planning competencies, only four were found to be significantly different in the reporting of the two groups.

### Administration

Administration includes arranging physical environment, establishing and maintaining procedures and routines, maintaining records, and organizing materials and equipment. Questionnaire III sent to the three groups contained nine competencies under the Administration category.

Table 17 shows chi-square values and percentages of responses obtained from business data processing authorities and high school teachers in the Administration area.

Competency No. 9, "Provision for repair and maintenance of equipment if needed," was believed to be crucial by authorities and high school teachers alike.

The following competencies in Administration were rated as highly desirable by both groups:

1. The ability to conduct conferences with parents, teachers, and students.
2. Arrangement of physical equipment conducive to a learning environment.
4. Establishment and maintenance of classroom procedures and routines.
7. Establishment of smooth classroom routines, including tardiness and absences, paper collection and return.

Table 17

Administration Competencies as Indicated by Authorities and  
High School Teachers, Including Degrees of Freedom,  
Chi-Square, and Percentages of Responses

| No. | DF | Chi-Square | Authorities (31) |    |    |    |    |   | High School Teachers (19) |    |    |    |    |    |
|-----|----|------------|------------------|----|----|----|----|---|---------------------------|----|----|----|----|----|
|     |    |            | C                | H  | D  | N  | I  | X | C                         | H  | D  | N  | I  | X  |
| 1   | 4  | 2.77       | 6                | 65 | 23 | 3  | -- | 3 | 11                        | 79 | 11 | -- | -- | -- |
| 2   | 5  | 3.28       | 13               | 58 | 19 | 3  | 3  | 3 | 11                        | 79 | 11 | -- | -- | -- |
| 3*  | 3  | 8.41       | 23               | 35 | 39 | -- | -- | 3 | 26                        | 68 | 5  | -- | -- | -- |
| 4   | 4  | .65        | 16               | 62 | 16 | -- | 3  | 3 | 26                        | 68 | 5  | -- | -- | -- |
| 5*  | 4  | 14.73      | 10               | 16 | 65 | 6  | -- | 3 | 63                        | 21 | 16 | -- | -- | -- |
| 6   | 4  | 4.84       | 29               | 16 | 45 | 6  | -- | 4 | 63                        | 21 | 16 | -- | -- | -- |
| 7   | 5  | 5.07       | 6                | 42 | 42 | 4  | 3  | 3 | 21                        | 68 | 11 | -- | -- | -- |
| 8   | 3  | 4.40       | 3                | 45 | 48 | -- | -- | 4 | 5                         | 79 | 16 | -- | -- | -- |
| 9   | 5  | 3.15       | 35               | 20 | 23 | 12 | 2  | 6 | 47                        | 42 | 5  | 5  | -- | -- |

\*Significant Difference at the .05 Level

1=3.841    3=7.815    5=11.070

2=5.991    4=9.448

A bimodal consensus was recorded for Competency No. 7. Forty-two percent of the authorities and 68 percent of the high school teachers considered this to be a highly desirable competency. However, 42 percent of the authority group also rated the competency crucial.

### Instruction

In this category are included structuring, motivating, and reinforcing students, providing for feedback, presenting information, and conducting learning activities. Using the Hebert model,<sup>62</sup> the competencies were divided into two areas--Content and Methodologies Techniques. Questionnaire III sent to the three groups listed 49 competencies in the Content area of the Instruction category and 39 competencies in the Methodologies/Techniques area of the Instruction category.

Content. Chi-square values and percentages of responses to Content competencies by business data processing authorities and high school teachers are given in Table 18.

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<sup>62</sup> Hebert, op cit.

Table 18

Instruction (Content) Competencies as Indicated by Authorities and  
High School Teachers, Including Degrees of Freedom,  
Chi-Square, and Percentages of Responses

| No. | DF | Chi-Square | Authorities (31) |    |    |    |    |    | High School Teachers (19) |    |    |    |    |    |
|-----|----|------------|------------------|----|----|----|----|----|---------------------------|----|----|----|----|----|
|     |    |            | C                | H  | D  | N  | I  | X  | C                         | H  | D  | N  | I  | X  |
| 1*  | 3  | 16.40      | 3                | 20 | 74 | 3  | -- | -- | 11                        | 79 | 11 | -- | -- | -- |
| 2   | 1  | 2.24       | 93               | 7  | -- | -- | -- | -- | 74                        | 26 | -- | -- | -- | -- |
| 3   | 2  | .02        | 86               | 10 | -- | -- | 4  | -- | 79                        | 16 | -- | -- | 5  | -- |
| 4*  | 3  | 8.97       | 71               | 19 | 3  | -- | 7  | -- | 32                        | 68 | -- | -- | -- | -- |
| 5*  | 2  | 7.51       | 71               | 19 | -- | -- | 10 | -- | 37                        | 63 | -- | -- | -- | -- |
| 6   | 4  | .52        | 20               | 30 | 36 | 7  | 7  | -- | 26                        | 42 | 26 | 5  | -- | -- |
| 7   | 4  | 1.16       | 41               | 45 | 7  | 4  | 3  | -- | 26                        | 68 | 5  | -- | -- | -- |
| 8   | 3  | 6.03       | 26               | 58 | 13 | 3  | -- | -- | 11                        | 89 | -- | -- | -- | -- |
| 9   | 3  | 6.80       | 16               | 32 | 48 | 4  | -- | -- | 21                        | 63 | 16 | -- | -- | -- |
| 10  | 4  | .20        | 10               | 66 | 7  | 3  | 14 | -- | 16                        | 68 | 11 | -- | 5  | -- |
| 11  | 3  | 6.81       | 14               | 31 | 48 | -- | 7  | -- | 21                        | 68 | 11 | -- | -- | -- |
| 12* | 3  | 9.99       | 56               | 30 | 10 | -- | 4  | -- | 11                        | 79 | 11 | -- | -- | -- |
| 13  | 5  | 10.97      | 3                | 9  | 20 | 62 | 3  | 3  | 11                        | 5  | 68 | 16 | -- | -- |
| 14  | 3  | .65        | 3                | 13 | 81 | 3  | -- | -- | 5                         | 26 | 68 | -- | -- | -- |
| 15  | 3  | 7.45       | 16               | 61 | 20 | 3  | -- | -- | 11                        | 26 | 63 | -- | -- | -- |
| 16* | 3  | 9.45       | 65               | 23 | 10 | -- | 2  | -- | 26                        | 74 | -- | -- | -- | -- |
| 17  | 3  | 2.58       | 9                | 71 | 10 | -- | 10 | -- | 16                        | 63 | 21 | -- | -- | -- |

\*Significant Difference at the .05 Level

1=3.841    3=7.815    5=11.070  
2=5.991    4=9.488

Table 18 continued

| No.  | DF | Chi-Square | Authorities (31) |    |    |    |    |    | High School Teachers (19) |    |    |    |    |    |
|------|----|------------|------------------|----|----|----|----|----|---------------------------|----|----|----|----|----|
|      |    |            | C                | H  | D  | N  | I  | X  | C                         | H  | D  | N  | I  | X  |
| 18   | 3  | 5.94       | 14               | 76 | 3  | -- | 7  | -- | 16                        | 68 | 16 | -- | -- | -- |
| 19   | 3  | 2.93       | 19               | 48 | 29 | -- | 3  | -- | --                        | 44 | 56 | -- | -- | -- |
| 20   | 3  | 5.33       | 13               | 60 | 20 | 7  | -- | -- | 5                         | 31 | 58 | 5  | -- | -- |
| 21   | 4  | 2.16       | 23               | 48 | 23 | 33 | 3  | -- | 5                         | 74 | 21 | -- | -- | -- |
| 22   | 3  | 5.31       | 13               | 26 | 61 | -- | -- | -- | 5                         | 63 | 26 | -- | -- | 5  |
| 23*  | 3  | 20.13      | 13               | 67 | 13 | 7  | -- | -- | 11                        | 5  | 79 | 5  | -- | -- |
| 24   | 5  | 1.88       | 3                | 23 | 52 | 10 | 6  | 6  | --                        | 21 | 79 | -- | -- | -- |
| 25   | 5  | 3.17       | 10               | 10 | 68 | 6  | 3  | 3  | --                        | 33 | 50 | 6  | -- | 11 |
| 26   | 4  | 7.31       | 13               | 19 | 68 | -- | -- | -- | 5                         | 5  | 74 | 11 | -- | 5  |
| 27   | 5  | 5.09       | 12               | 30 | 38 | 12 | 4  | 4  | 11                        | 11 | 58 | 16 | -- | 5  |
| 28*  | 4  | 18.14      | --               | 31 | 60 | 6  | 3  | -- | 21                        | 68 | 11 | -- | -- | -- |
| 29*  | 3  | 12.40      | 7                | 19 | 74 | -- | -- | -- | --                        | 63 | 32 | -- | -- | 5  |
| 30*  | 5  | 11.57      | 20               | 17 | 53 | 7  | 3  | -- | 5                         | 58 | 26 | -- | 5  | 5  |
| 31.1 | 3  | 1.50       | 29               | 48 | 19 | -- | 4  | -- | 26                        | 63 | 11 | -- | -- | -- |
| 31.2 | 4  | 7.93       | 10               | 48 | 36 | 3  | 3  | -- | 16                        | 79 | 5  | -- | -- | -- |
| 31.3 | 5  | 5.29       | 4                | 46 | 31 | 15 | 4  | -- | 11                        | 47 | 26 | 5  | -- | 11 |
| 31.4 | 5  | 1.31       | 3                | 14 | 64 | 16 | 3  | -- | 5                         | 5  | 68 | 11 | -- | 11 |
| 31.5 | 5  | .95        | 6                | 19 | 58 | 13 | 4  | -- | 5                         | 5  | 68 | 16 | -- | 5  |
| 31.6 | 5  | 1.59       | 3                | 16 | 58 | 19 | 3  | -- | 5                         | 5  | 63 | 16 | -- | 11 |
| 31.7 | 5  | 1.35       | 6                | 23 | 51 | 16 | 3  | -- | 5                         | 32 | 42 | 11 | -- | 11 |
| 31.8 | 5  | 4.88       | 6                | 16 | 55 | 19 | 3  | -- | 5                         | 42 | 26 | 16 | -- | 11 |
| 31.9 | 5  | 3.50       | 7                | 13 | 43 | 17 | 20 | -- | 5                         | 5  | 68 | 16 | -- | 5  |

\*Significant Difference at the .05 Level

1=3.841    3=7.815    5=11.070

2=5.991    4=9.488

Table 18 continued

| No.   | DF | Chi-Square | Authorities (31) |    |    |    |    |    | High School Teachers (19) |    |    |    |    |    |
|-------|----|------------|------------------|----|----|----|----|----|---------------------------|----|----|----|----|----|
|       |    |            | C                | H  | D  | N  | I  | X  | C                         | H  | D  | N  | I  | X  |
| 31.10 | 4  | 2.52       | --               | -- | 33 | 63 | 3  | -- | 5                         | -- | 47 | 37 | -- | 11 |
| 31.11 | 5  | 4.94       | --               | 7  | 56 | 30 | 3  | 4  | 5                         | -- | 21 | 63 | -- | 11 |
| 31.12 | 5  | 6.23       | --               | 3  | 55 | 39 | 3  | -- | 5                         | -- | 47 | 37 | -- | 11 |
| 31.13 | 5  | .44        | --               | 13 | 61 | 20 | 6  | -- | 5                         | 11 | 68 | 11 | -- | 5  |
| 32    | 5  | 6.54       | 6                | 6  | 16 | 10 | 52 | 10 | --                        | 6  | 17 | 44 | 22 | 11 |
| 33    | 3  | .08        | 33               | 58 | 6  | -- | 3  | -- | 26                        | 68 | 5  | -- | -- | -- |
| 34    | 2  | .02        | 19               | 61 | 19 | -- | -- | -- | 16                        | 68 | 16 | -- | -- | -- |
| 35    | 3  | 14.92      | 58               | 32 | 6  | -- | 4  | -- | --                        | 74 | 26 | -- | -- | -- |
| 36    | 4  | 2.39       | 3                | 10 | 61 | 26 | -- | -- | --                        | 5  | 84 | 5  | -- | 5  |
| 37    | 4  | 3.10       | 6                | -- | 71 | 23 | -- | -- | 5                         | 16 | 63 | 11 | -- | 5  |

\*Significant Difference at the .05 Level

1=3.841    3=7.815    5=11.070

2=5.991    4=9.488

By modal consensus, the two groups rated the following competencies as crucial: Competency No. 2, "Knowledge of data processing terminology"; Competency No. 3, "Knowledge and application of data processing functions."

Those competencies which were rated as highly desirable by both groups follow:

7. Knowledge of use of punched cards.
8. Knowledge of record planning and layout for various mediums.
10. Ability to construct codes.
17. Knowledge of the minicomputer.
18. Knowledge about information storage and retrieval.
21. Knowledge of documentation standards.
31. Knowledge of computer languages and relative importance of each:
  - 31.1 COBOL
  - 31.2 Fortran
  - 31.3 Basic
33. Knowledge of input/output media.
34. Knowledge of report design.

Nine of the 49 Content competencies were found to be significantly different in the reporting of the two groups.

Methodologies/Techniques. A comparison of the responses of authorities and high school teachers to competencies in the Instruction--Methodologies/Techniques category is shown in Table 19. Chi-square values of the differences and similarities between the two groups are given as well as the percentage of responses.

Only one competency, Competency No. 7, "Ability to demonstrate flow charting," was rated crucial by the consensus of both groups.

The following competencies were rated highly desirable by the consensus of both groups:

1. Application of psychological principles of learning regarding:
  - 1.2 Motivation
  - 1.3 Practice
  - 1.5 Whole vs. part learning
4. Ability to teach computer (programming) languages:
  - 4.1 COBOL
6. Ability to present systems design for data processing application.
9. Ability to transfer unit-record concepts to computer concepts.

Fifteen competencies in the Methodologies/Techniques category were found to be significantly different in the reporting of the two groups.

Table 19

Instruction (Methodologies/Techniques) Competencies as Indicated  
by Authorities and High School Teachers, Including  
Degrees of Freedom, Chi-Square, and  
Percentages of Responses

| No.  | DF | Chi-Square | Authorities (31) |    |    |    |    |    | High School Teachers (19) |    |    |    |    |    |
|------|----|------------|------------------|----|----|----|----|----|---------------------------|----|----|----|----|----|
|      |    |            | C                | H  | D  | N  | I  | X  | C                         | H  | D  | N  | I  | X  |
| 1.1* | 4  | 9.89       | 48               | 16 | 24 | -- | 6  | 6  | 21                        | 68 | 11 | -- | -- | -- |
| 1.2  | 4  | 4.05       | 30               | 40 | 20 | -- | 6  | 4  | 16                        | 79 | 5  | -- | -- | -- |
| 1.3  | 4  | .54        | 23               | 48 | 19 | -- | 7  | 4  | 26                        | 63 | 11 | -- | -- | -- |
| 1.4* | 4  | 23.03      | 13               | 10 | 61 | -- | 13 | 3  | 19                        | 81 | 1  | -- | -- | -- |
| 1.5  | 4  | 3.84       | 3                | 52 | 23 | -- | 19 | 3  | 11                        | 79 | 11 | -- | -- | -- |
| 1.6* | 5  | 12.50      | 19               | 46 | 16 | 3  | 13 | 3  | 86                        | 14 | -- | -- | -- | -- |
| 2.1* | 5  | 12.50      | 6                | 19 | 55 | 14 | 3  | 3  | 11                        | 74 | 11 | 5  | -- | -- |
| 2.2* | 5  | 11.14      | 13               | 23 | 55 | 3  | 3  | 3  | 11                        | 74 | 11 | 5  | -- | -- |
| 2.3  | 5  | .68        | 6                | 19 | 49 | 16 | 4  | 6  | 5                         | 16 | 42 | 32 | -- | 5  |
| 2.4* | 3  | 9.07       | 65               | 16 | 16 | -- | 3  | -- | 26                        | 63 | 11 | -- | -- | -- |
| 2.5  | 5  | .06        | 7                | 19 | 48 | 15 | 3  | 7  | 5                         | 21 | 58 | 11 | -- | 5  |
| 2.6  | 5  | 5.18       | 10               | 23 | 26 | 32 | 3  | 6  | 5                         | 26 | 58 | 5  | -- | 5  |
| 2.7  | 5  | 1.28       | 6                | 19 | 36 | 29 | 3  | 6  | 5                         | 16 | 58 | 16 | -- | 5  |
| 2.8  | 5  | 7.40       | 48               | 29 | 19 | -- | 3  | -- | 5                         | 42 | 42 | 5  | -- | 5  |
| 2.9  | 4  | 1.86       | 32               | 48 | 13 | 3  | 3  | -- | 58                        | 32 | 5  | 5  | -- | -- |
| 3.   | 3  | 7.21       | 53               | 34 | 10 | 3  | -- | -- | 16                        | 79 | 5  | -- | -- | -- |

\*Significant Difference at the .05 Level

1=3.841    3=7.815    5=11.070

2=5.991    4=9.488

Table 19 continued

| No.   | DF | Chi-Square | Authorities (31) |    |    |    |    |    | High School Teachers (19) |    |    |    |    |    |
|-------|----|------------|------------------|----|----|----|----|----|---------------------------|----|----|----|----|----|
|       |    |            | C                | H  | D  | N  | I  | X  | C                         | H  | D  | N  | I  | X  |
| 4.1*  | 3  | 10.60      | 38               | 41 | 9  | 9  | 3  | -- | 11                        | 84 | 5  | -- | -- | -- |
| 4.2   | 4  | 13.61      | 23               | 23 | 41 | 10 | 3  | -- | --                        | 84 | 16 | -- | -- | -- |
| 4.3   | 5  | 7.38       | 6                | 19 | 49 | 23 | 3  | -- | --                        | 53 | 37 | -- | -- | 11 |
| 4.4   | 4  | 5.44       | 3                | -- | 36 | 58 | 3  | -- | 5                         | -- | 63 | 21 | -- | 11 |
| 4.5*  | 4  | 11.79      | 3                | 19 | 29 | 50 | -- | -- | 5                         | 5  | 63 | 16 | -- | 11 |
| 4.6   | 5  | 5.66       | 6                | 3  | 39 | 48 | 3  | -- | --                        | -- | 79 | 16 | -- | 5  |
| 4.7   | 5  | 2.25       | 6                | 13 | 55 | 23 | 3  | -- | --                        | 26 | 53 | 11 | -- | 11 |
| 4.8   | 5  | 1.77       | 6                | 10 | 58 | 23 | 3  | -- | --                        | 21 | 53 | 16 | -- | 11 |
| 4.9*  | 5  | 13.81      | 6                | 10 | 13 | 45 | 23 | 3  | 5                         | -- | 68 | 22 | -- | 5  |
| 4.10* | 3  | 9.75       | --               | -- | 13 | 77 | 6  | 3  | --                        | -- | 58 | 32 | -- | 11 |
| 4.11  | 4  | 8.57       | --               | 3  | 16 | 68 | 13 | -- | --                        | 5  | 53 | 32 | -- | 11 |
| 4.12* | 4  | 15.75      | --               | 3  | 10 | 81 | 6  | -- | --                        | -- | 63 | 26 | -- | 11 |
| 4.13* | 5  | 15.36      | 3                | 10 | 16 | 58 | 10 | 3  | --                        | 26 | 63 | 5  | -- | 5  |
| 5     | 4  | 4.75       | 45               | 29 | 19 | 3  | 3  | -- | 21                        | 68 | 11 | -- | -- | -- |
| 6     | 3  | 1.49       | 13               | 65 | 23 | -- | -- | -- | 11                        | 79 | 5  | -- | -- | 5  |
| 7     | 2  | .32        | 68               | 26 | 6  | -- | -- | -- | 63                        | 37 | -- | -- | -- | -- |
| 8*    | 4  | 16.35      | 51               | 23 | 17 | 6  | 3  | -- | 5                         | 89 | 5  | -- | -- | -- |
| 9     | 4  | 1.27       | 10               | 61 | 19 | 6  | -- | 3  | 26                        | 58 | 16 | -- | -- | -- |
| 10*   | 3  | 13.37      | 10               | 23 | 58 | 10 | -- | -- | 11                        | 79 | 11 | -- | -- | -- |
| 11    | 4  | 7.80       | 13               | 3  | 61 | 23 | -- | -- | --                        | 11 | 68 | 11 | -- | 11 |
| 12*   | 2  | 11.48      | 13               | 68 | 19 | -- | -- | -- | 16                        | 21 | 63 | -- | -- | -- |
| 13    | 4  | 6.77       | 3                | 24 | 52 | 14 | -- | 7  | 5                         | 68 | 21 | 5  | -- | -- |

\*Significant Difference at the .05 Level

1=3.841 3=7.815 5=11.070

2=5.991 4=9.488

## Communication

Communication competencies are those involving the operation of hardware (audio-visual equipment) and initiating and responding verbally and nonverbally. Sixteen competencies were listed in this category on Questionnaire III.

Chi-square values obtained for differences in responses between business data processing authorities and high school teachers as well as percentages of responses obtained from the two groups regarding Communication competencies are given in Table 20.

None of the sixteen Communication competencies were rated crucial by authorities and high school teachers.

The consensus of both groups rated the following competencies as highly desirable: Competency 3.9, "Familiarity with several media for use in teaching data processing and knowledge of relative value of each: Bulletin board"; and Competency No. 7, "Ability to use nonverbal communication."

Thirteen of the sixteen Communication competencies were found to be significantly different in the reporting of the two groups.

Table 20

Communication Competencies as Indicated by Authorities and  
High School Teachers, Including Degrees of Freedom,  
Chi-Square, and Percentages of Responses

| No.  | DF | Chi-Square | Authorities (31) |    |    |    |    |   | High School Teachers (19) |    |    |    |    |    |
|------|----|------------|------------------|----|----|----|----|---|---------------------------|----|----|----|----|----|
|      |    |            | C                | H  | D  | N  | I  | X | C                         | H  | D  | N  | I  | X  |
| 1*   | 3  | 12.74      | 70               | 23 | 3  | -- | -- | 3 | 16                        | 79 | 5  | -- | -- | -- |
| 2*   | 3  | 12.71      | 57               | 37 | 3  | -- | -- | 3 | 5                         | 95 | -- | -- | -- | -- |
| 3.1* | 3  | 8.31       | 63               | 30 | 3  | -- | -- | 3 | 21                        | 79 | -- | -- | -- | -- |
| 3.2* | 3  | 9.28       | 58               | 35 | 4  | -- | -- | 4 | 11                        | 84 | 5  | -- | -- | -- |
| 3.3  | 4  | 2.62       | 10               | 33 | 47 | 6  | -- | 3 | 5                         | 63 | 26 | -- | -- | 5  |
| 3.4* | 4  | 11.18      | 7                | 7  | 80 | 3  | -- | 3 | --                        | 53 | 37 | 5  | -- | 5  |
| 3.5* | 4  | 11.35      | 7                | 17 | 67 | 6  | -- | 3 | 5                         | 68 | 21 | -- | -- | 5  |
| 3.6* | 4  | 10.29      | 10               | 30 | 53 | 3  | -- | 3 | 16                        | 74 | 5  | 5  | -- | -- |
| 3.7* | 4  | 11.48      | 7                | 20 | 67 | 3  | -- | 3 | 16                        | 68 | 16 | -- | -- | -- |
| 3.8* | 4  | 18.88      | 7                | 7  | 74 | 10 | -- | 2 | 5                         | 68 | 21 | -- | -- | 5  |
| 3.9  | 5  | .90        | 13               | 47 | 30 | 3  | 3  | 3 | 5                         | 68 | 21 | 5  | -- | -- |
| 4*   | 3  | 14.16      | 73               | 13 | 10 | -- | -- | 3 | 18                        | 71 | 12 | -- | -- | -- |
| 5*   | 3  | 15.65      | 70               | 20 | 6  | -- | -- | 3 | 10                        | 79 | 11 | -- | -- | -- |
| 6*   | 4  | 15.18      | 55               | 26 | 13 | -- | 3  | 3 | 5                         | 90 | 5  | -- | -- | -- |
| 7    | 3  | .77        | 14               | 69 | 14 | -- | -- | 3 | 5                         | 90 | 5  | -- | -- | -- |
| 8*   | 3  | 17.11      | 83               | 10 | 3  | -- | -- | 3 | 26                        | 74 | -- | -- | -- | -- |

\*Significant Difference at the .05 Level

1=3.841    3=7.815    5=11.070

2=5.991    4=9.448

### Evaluation

Included in this category are selecting and assessing instruments, diagnosing student difficulties or abilities, and involving the students in self-evaluation. Questionnaire III contained eight competencies in the Evaluation category.

Chi-square values obtained for differences in responses between business data processing authorities and high school teachers as well as percentages of responses obtained from the two groups regarding Evaluation competencies are shown in Table 21.

None of the Evaluation competencies were rated crucial by authorities and high school teachers.

The following competencies were rated by both groups as highly desirable:

2. Construction of valid and reliable measurement techniques.
3. Use of pretest and posttest when applicable.
4. Self-evaluation of teacher techniques and methods for self-improvement purposes.
6. Use of student self-evaluation of his learning whenever feasible.

Significant differences were found in the reporting of the two groups on four competencies.

Table 21

Evaluation Competencies as Indicated by Authorities and High  
School Teachers, Including Degrees of Freedom,  
Chi-Square, and Percentages of Responses

| No. | DF | Chi-Square | Authorities (31) |    |    |    |    |    | High School Teachers (19) |    |    |    |    |    |
|-----|----|------------|------------------|----|----|----|----|----|---------------------------|----|----|----|----|----|
|     |    |            | C                | H  | D  | N  | I  | X  | C                         | H  | D  | N  | I  | X  |
| 1*  | 3  | 10.08      | 60               | 37 | -- | -- | -- | 3  | 11                        | 79 | 11 | -- | -- | -- |
| 2   | 3  | 1.06       | 27               | 67 | 3  | -- | -- | 3  | 11                        | 79 | 11 | -- | -- | -- |
| 3   | 4  | 1.23       | 13               | 52 | 26 | 3  | -- | 7  | 5                         | 63 | 21 | 5  | -- | 5  |
| 4   | 4  | 7.15       | 33               | 47 | 13 | 5  | -- | 5  | 5                         | 84 | 11 | -- | -- | -- |
| 5*  | 4  | 15.09      | 20               | 47 | 27 | 3  | -- | 3  | --                        | 42 | 53 | 5  | -- | -- |
| 6   | 4  | 2.58       | 7                | 73 | 14 | 3  | -- | 3  | --                        | 89 | 11 | -- | -- | -- |
| 7*  | 2  | 21.69      | 77               | 15 | 8  | -- | -- | -- | 11                        | 84 | 5  | -- | -- | -- |
| 8*  | 3  | 21.26      | 73               | 17 | 7  | -- | 3  | -- | 11                        | 79 | 11 | -- | -- | -- |

\*Significant Difference at the .05 Level

1=3.841    3=7.815    5=11.070

2=5.991    4=9.488

### Developing Pupil-Self

Included in this category are developing pupil-self concept, social interaction skills, learning-to-learn skills, and acceptance of responsibility. This general category is included in this study as it is a part of the Dodl categories<sup>63</sup> and because the introductory data processing teacher has the opportunity to develop pupil-self concept.

Competency ratings by authorities and high school teachers are indicated in Table 22. In addition, this table also indicates chi-square values of the differences and similarities between the ratings of the two groups.

Only Competency No. 14, "Stressing the need for regular attendance in the classroom," was considered crucial by a consensus of both groups.

The following competencies in the Developing Pupil-Self category were rated highly desirable by business education authorities and high school teachers:

1. Assisting student in accepting responsibility of reaching his goals. (e.g., correct homework procedures, practice, etc.)

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<sup>63</sup>Dodl, op. cit.

Table 22

Developing Pupil-Self Competencies as Indicated by Authorities and  
High School Teachers, Including Degrees of Freedom,  
Chi-Square, and Percentages of Responses

| No. | DF | Chi-Square | Authorities (31) |    |    |    |    |    | High School Teachers (19) |    |    |    |    |    |
|-----|----|------------|------------------|----|----|----|----|----|---------------------------|----|----|----|----|----|
|     |    |            | C                | H  | D  | N  | I  | X  | C                         | H  | D  | N  | I  | X  |
| 1   | 3  | .89        | 24               | 62 | 11 | -- | -- | 3  | 21                        | 74 | 5  | -- | -- | -- |
| 2   | 2  | 1.52       | 17               | 73 | 10 | -- | -- | -- | 5                         | 84 | 11 | -- | -- | -- |
| 3   | 5  | 1.06       | 17               | 57 | 17 | 3  | 3  | 3  | 16                        | 79 | 5  | -- | -- | -- |
| 4*  | 3  | 17.45      | 63               | 17 | 17 | -- | -- | 3  | 16                        | 84 | -- | -- | -- | -- |
| 5*  | 3  | 18.08      | 63               | 20 | 13 | -- | -- | 3  | 11                        | 89 | -- | -- | -- | -- |
| 6   | 4  | 4.52       | 20               | 57 | 13 | 7  | -- | 3  | --                        | 95 | 5  | -- | -- | -- |
| 7*  | 4  | 9.86       | 10               | 24 | 48 | 14 | -- | 3  | --                        | 79 | 21 | -- | -- | -- |
| 8   | 5  | 10.25      | 7                | 23 | 40 | 20 | 3  | 7  | --                        | 79 | 21 | -- | -- | -- |
| 9   | 5  | .91        | 3                | 27 | 50 | 13 | 3  | 3  | --                        | 21 | 74 | 5  | -- | -- |
| 10* | 4  | 10.96      | 57               | 17 | 10 | 13 | -- | 3  | 21                        | 68 | 11 | -- | -- | -- |
| 11  | 4  | 1.06       | 26               | 52 | 16 | 3  | -- | 3  | 21                        | 74 | 5  | -- | -- | -- |
| 12* | 2  | 14.88      | 71               | 19 | 10 | -- | -- | -- | 26                        | 74 | -- | -- | -- | -- |
| 13  | 3  | 1.85       | 33               | 47 | 17 | 3  | -- | -- | 16                        | 74 | 11 | -- | -- | -- |
| 14  | 5  | 3.51       | 50               | 11 | 25 | 7  | 4  | 3  | 63                        | 32 | 5  | -- | -- | -- |

\*Significant Difference at the .05 Level

1=3.841    3=7.815    4=11.070

2=5.991    4=9.448

2. Development of ability in student to accept constructive criticism.
3. Development of ability in student to work under pressure.
6. Guidance regarding data processing as a vocational possibility, or work with counselor to provide services.
11. Development of ability in student to persevere.
13. Development of ability to use reference materials.

Of the fourteen competencies in this category, five were significantly different in the responses of the two groups.

#### Personal Attributes

The Personal Attributes category includes accepting self, evaluating and improving self, planning for one's self-improvement, and solving problems. The area also includes interacting with others--both students and peers.

Table 23 contains chi-square values and percentages of responses obtained from business data processing authorities and high school teachers in the Personal Attributes area.

Nine of the thirteen Personal Attributes competencies were found to be significantly different in the reporting of the two groups.

Table 23

Personal Attributes Competencies as Indicated by Authorities and  
High School Teachers, Including Degrees of Freedom,  
Chi-Square, and Percentages of Responses

| No. | DF | Chi-Square | Authorities (31) |    |    |    |    |    | High School Teachers (19) |    |    |    |    |    |
|-----|----|------------|------------------|----|----|----|----|----|---------------------------|----|----|----|----|----|
|     |    |            | C                | H  | D  | N  | I  | X  | C                         | H  | D  | N  | I  | X  |
| 1*  | 2  | 10.0       | 57               | 27 | 17 | -- | -- | -- | 16                        | 79 | 5  | -- | -- | -- |
| 2   | 4  | 8.98       | 60               | 27 | 6  | -- | 3  | 3  | 21                        | 79 | -- | -- | -- | -- |
| 3*  | 4  | 11.18      | 48               | 29 | 19 | 3  | -- | -- | 11                        | 68 | 16 | -- | 5  | -- |
| 4*  | 3  | 12.20      | 67               | 23 | 7  | -- | -- | 3  | 16                        | 79 | 5  | -- | -- | -- |
| 5   | 5  | .07        | 13               | 70 | 10 | 3  | -- | 3  | 17                        | 72 | 6  | -- | 6  | -- |
| 6   | 3  | 1.42       | 59               | 21 | 14 | -- | -- | 7  | 47                        | 42 | 11 | -- | -- | -- |
| 7*  | 2  | 11.82      | 41               | 45 | 13 | -- | -- | -- | --                        | 89 | 11 | -- | -- | -- |
| 8*  | 2  | 13.90      | 77               | 17 | 6  | -- | -- | -- | 21                        | 74 | 5  | -- | -- | -- |
| 9*  | 4  | 14.25      | 67               | 16 | 10 | -- | 4  | 3  | 21                        | 79 | -- | -- | -- | -- |
| 10  | 3  | .02        | 70               | 20 | 7  | -- | -- | 3  | 69                        | 26 | 5  | -- | -- | -- |
| 11* | 3  | 17.45      | 63               | 17 | 17 | -- | -- | 3  | 16                        | 84 | -- | -- | -- | -- |
| 12* | 4  | 15.78      | 58               | 16 | 16 | -- | 3  | 7  | 11                        | 79 | 11 | -- | -- | -- |
| 13* | 3  | 22.32      | 61               | 13 | 26 | -- | -- | -- | 11                        | 79 | 11 | 5  | -- | -- |

\*Significant Difference at the .05 Level

1=3.841    3=7.815    5=11.070

2=5.991    4=9.488

The following competencies were rated crucial by business data processing authorities and high school teachers: Competency No. 6, "Development of students' confidence by never violating their trust"; and Competency No. 10, "Establishment of proper teacher behavior as an example to students."

Competency No. 5, "Establishment of rapport with administrative and supervisory personnel," and Competency No. 7, "Establishing a need for creativity," were rated highly desirable by a modal consensus of both groups.

#### High School and Junior College Teachers

A description follows of the responses of high school and junior college teachers to competencies in Questionnaire III. Appendix O, page 237, contains a complete listing of those competencies rated crucial and highly desirable by a modal consensus of high school and junior college teachers. A list of those competencies rated crucial and highly desirable by 50 percent or more of either group is also included in Appendix O, page 237. A complete listing of those competencies found to be significantly different in the reporting of the different groups is shown in Appendix P, page 249.

## Planning

Included in the category of Planning are selecting aims, objectives, goals; collaborating with others in planning, developing classroom procedures; selecting or developing materials and activities; and organizing students. Questionnaire III sent to the three groups contained 37 competency statements under the Planning category.

Chi-square values and percentages of responses to the Planning competencies by high school and junior college teachers are shown in Table 24.

Considerable similarity was found in the reporting of the groups in the Planning category. Of the 37 competencies included in this section, only Competency No. 36, "Ability to recommend selection of equipment," was found to be significantly different in the reporting of the two groups. Eighty-four percent of the high school teachers believed this to be a highly desirable competency while 53 percent of the junior college teachers rated the competency desirable.

Only Competency No. 16, "Knowledge of the end results-- what the student is expected to accomplish by the completion of the course," was rated as a crucial competency by both groups.

Table 24

Planning Competencies as Indicated by High School and Junior  
College Teachers, Including Degrees of Freedom,  
Chi-Square, and Percentages of Responses

| No. | DF | Chi-Square | High School Teachers (19) |    |    |    |    |    | Junior College Teachers (44) |    |    |    |    |    |
|-----|----|------------|---------------------------|----|----|----|----|----|------------------------------|----|----|----|----|----|
|     |    |            | C                         | H  | D  | N  | I  | X  | C                            | H  | D  | N  | I  | X  |
| 1   | 3  | 2.93       | --                        | 37 | 63 | -- | -- | -- | 7                            | 57 | 34 | 2  | -- | -- |
| 2   | 2  | .38        | 26                        | 74 | -- | -- | -- | -- | 37                           | 61 | 2  | -- | -- | -- |
| 3   | 3  | 5.68       | 11                        | 89 | -- | -- | -- | -- | 16                           | 54 | 28 | -- | 2  | -- |
| 4   | 4  | .36        | 21                        | 63 | 16 | -- | -- | -- | 23                           | 49 | 23 | 3  | 2  | -- |
| 5   | 2  | 4.97       | 21                        | 79 | -- | -- | -- | -- | 18                           | 54 | 28 | -- | -- | -- |
| 6   | 2  | .48        | 11                        | 61 | 28 | -- | -- | -- | 23                           | 56 | 21 | -- | -- | -- |
| 7   | 2  | .00        | 21                        | 53 | 26 | -- | -- | -- | 24                           | 48 | 28 | -- | -- | -- |
| 8   | 3  | 7.17       | 68                        | 21 | 11 | -- | -- | -- | 30                           | 61 | 9  | -- | -- | -- |
| 9   | 4  | 5.24       | 5                         | 53 | 37 | -- | -- | 5  | 2                            | 26 | 44 | 23 | 5  | -- |
| 10  | 4  | 2.49       | 5                         | 42 | 47 | -- | -- | 5  | 2                            | 30 | 44 | 19 | 5  | -- |
| 11  | 2  | 1.20       | 42                        | 53 | 5  | -- | -- | -- | 36                           | 43 | 21 | -- | -- | -- |
| 12  | 3  | 4.23       | 37                        | 53 | 11 | -- | -- | -- | 12                           | 56 | 28 | 4  | -- | -- |
| 13  | 3  | 2.09       | 26                        | 68 | -- | 5  | -- | -- | 16                           | 63 | 19 | 2  | -- | -- |
| 14  | 4  | 7.17       | 5                         | 79 | 16 | -- | -- | -- | 5                            | 36 | 41 | 9  | 4  | -- |
| 15  | 2  | 5.23       | 11                        | 89 | -- | -- | -- | -- | 14                           | 74 | 23 | -- | -- | -- |
| 16  | 2  | .90        | 74                        | 26 | -- | -- | -- | -- | 56                           | 37 | 7  | -- | -- | -- |
| 17  | 3  | .10        | 11                        | 53 | 32 | 5  | -- | -- | 14                           | 43 | 33 | 10 | -- | -- |

\*Significant Difference at the .05 Level

1=3.841    3=7.815    5=11.070

2=5.991    4=9.488

Table 24 continued

| No. | DF | Chi-Square | High School Teachers (19) |    |    |    |    |    | Junior College Teachers (44) |    |    |    |    |    |
|-----|----|------------|---------------------------|----|----|----|----|----|------------------------------|----|----|----|----|----|
|     |    |            | C                         | H  | D  | N  | I  | X  | C                            | H  | D  | N  | I  | X  |
| 18  | 3  | .62        | 11                        | 56 | 33 | -- | -- | -- | 12                           | 47 | 31 | 10 | -- | -- |
| 19  | 2  | .11        | 26                        | 63 | 11 | -- | -- | -- | 33                           | 53 | 14 | -- | -- | -- |
| 20  | 3  | 5.79       | 11                        | 68 | 21 | -- | -- | -- | 5                            | 35 | 58 | 2  | -- | -- |
| 21  | 3  | 1.49       | 16                        | 63 | 21 | -- | -- | -- | 7                            | 49 | 39 | 5  | -- | -- |
| 22  | 3  | .00        | 21                        | 58 | 21 | -- | -- | -- | 24                           | 55 | 19 | 2  | -- | -- |
| 23  | 3  | 2.63       | 11                        | 74 | 16 | -- | -- | -- | 12                           | 51 | 21 | 16 | -- | -- |
| 24  | 4  | 2.66       | --                        | 26 | 68 | -- | -- | 5  | 2                            | 26 | 51 | 19 | -- | 2  |
| 25  | 3  | .22        | 21                        | 68 | 11 | -- | -- | -- | 28                           | 56 | 14 | 2  | -- | -- |
| 26  | 2  | .00        | 16                        | 68 | 16 | -- | -- | -- | 16                           | 70 | 14 | -- | -- | -- |
| 27  | 2  | 1.66       | 16                        | 74 | 11 | -- | -- | -- | 13                           | 57 | 30 | -- | -- | -- |
| 28  | 3  | 1.65       | 11                        | 63 | 26 | -- | -- | -- | 28                           | 56 | 14 | 2  | -- | -- |
| 29  | 5  | 2.02       | --                        | 37 | 53 | 5  | -- | 5  | 5                            | 19 | 50 | 19 | 5  | 2  |
| 30  | 4  | 4.26       | --                        | 58 | 42 | -- | -- | -- | 12                           | 66 | 15 | 5  | 2  | -- |
| 31  | 3  | .91        | 21                        | 47 | 26 | 5  | -- | -- | 30                           | 56 | 9  | -- | -- | -- |
| 32  | 2  | 2.66       | 37                        | 63 | -- | -- | -- | -- | 35                           | 47 | 18 | -- | -- | -- |
| 33  | 3  | .29        | --                        | 32 | 68 | -- | -- | -- | 2                            | 21 | 72 | 5  | -- | -- |
| 34  | 4  | 6.24       | 16                        | 53 | 32 | -- | -- | -- | 44                           | 44 | 6  | 3  | 3  | -- |
| 35  | 3  | 2.33       | 5                         | 58 | 32 | 5  | -- | -- | 5                            | 32 | 51 | 12 | -- | -- |
| 36* | 3  | 14.82      | --                        | 84 | 11 | 5  | -- | -- | 9                            | 26 | 53 | 12 | -- | -- |
| 37  | 4  | .13        | 32                        | 58 | 5  | -- | 5  | -- | 39                           | 48 | 7  | -- | 6  | -- |

\*Significant Difference at the .05 Level

1=3.841    3=7.815    5=11.070

2=5.991    4=9.488

The following 25 Planning competencies were rated as highly desirable by both groups.

2. Relationship of the data processing course to positions in industry and business.
3. Relationship of the data processing course to the consumer and society.
4. Preparation of a syllabus for the teacher's use.
5. Preparation of supplementary instructional materials.
6. Preparation of a syllabus for the data processing course.
7. Use of a syllabus for the data processing course.
11. Preparation of an adequate lesson plan.
12. Development of instructional strategies appropriate to students' stated objectives and students' learning styles.
13. Recognition of the need for strategies appropriate to students' stated objectives and students' learning styles.
15. Provision for various teaching methods using creativity and imagination.
17. Development of behavioral objectives.
18. Use of behavioral objectives.
19. Selection of required textbooks or materials.
21. Selection of supplementary materials.
22. Establishment of grading standards.

23. Establishment of grading standards based on students' competencies and established objectives.
25. Collaboration with businesses employing students for updating course content.
26. Collaboration with other data processing teachers, business education teachers, and administrators in planning.
27. Planning course outline using long-range objectives.
28. Knowledge of content resulting from practical business experience in positions involving data processing.
30. Knowledge of advanced data processing systems for teaching more effectively.
31. Provision for exercises using data processing equipment.
32. Provision for "hands-on" experience if equipment is available.
37. Concepts of data processing to be learned by the students.

Although Competency No. 34, "Provision for exercises using computer program assignments," was rated highly desirable by 53 percent of the high school teachers and 44 percent of the junior college teachers, a bimodal consensus was reported in the teacher group. Forty-four percent of the teachers also rated the competency as crucial.

## Administration

Administration includes arranging physical environment, establishing and maintaining procedures and routines, maintaining records, and organizing materials and equipment. Questionnaire III sent to the three groups contained nine competencies in the

Administration category.

Competencies in the Administration category are indicated in Table 25. Also shown in this table are percentages of responses obtained from high school and junior college teachers in the Administration area.

Although none of the nine Administration competencies were rated crucial by high school and junior college teachers, five of the competencies were ranked as highly desirable by a consensus of the two groups. These were:

1. The ability to conduct conferences with parents, teachers, and students.
3. Organization of teaching equipment, materials, etc.
4. Establishment and maintenance of classroom procedures and routines.
7. Establishment of smooth classroom routines, including tardiness and absences, paper collection and return.
8. Establishment of rapport with community organizations to facilitate field trips.

Table 25

Administration Competencies as Indicated by High School and  
Junior College Teachers, Including Degrees of Freedom,  
Chi-Square, and Percentages of Responses

| No. | DF | Chi-Square | High School Teachers (19) |    |    |    |    |    | Junior College Teachers (44) |    |    |    |    |    |
|-----|----|------------|---------------------------|----|----|----|----|----|------------------------------|----|----|----|----|----|
|     |    |            | C                         | H  | D  | N  | I  | X  | C                            | H  | D  | N  | I  | X  |
| 1   | 4  | 3.98       | 11                        | 79 | 11 | -- | -- | -- | 7                            | 49 | 37 | 5  | -- | 2  |
| 2*  | 2  | 7.36       | 11                        | 79 | 11 | -- | -- | -- | 7                            | 42 | 51 | -- | -- | -- |
| 3   | 2  | 1.08       | 26                        | 68 | 5  | -- | -- | -- | 14                           | 70 | 16 | -- | -- | -- |
| 4   | 3  | 4.26       | 26                        | 68 | 5  | -- | -- | -- | 12                           | 53 | 33 | 2  | -- | -- |
| 5*  | 3  | 14.03      | 63                        | 21 | 16 | -- | -- | -- | 12                           | 49 | 30 | 9  | -- | -- |
| 6*  | 3  | 10.70      | 63                        | 21 | 16 | -- | -- | -- | 16                           | 53 | 26 | 5  | -- | -- |
| 7   | 3  | 5.34       | 21                        | 68 | 11 | -- | -- | -- | 7                            | 44 | 35 | 12 | -- | -- |
| 8   | 3  | .84        | 5                         | 79 | 16 | -- | -- | -- | 7                            | 60 | 28 | 5  | -- | -- |
| 9   | 4  | 7.52       | 47                        | 42 | 5  | 5  | -- | -- | 14                           | 40 | 30 | 12 | 5  | -- |

\*Significant Difference at the .05 Level

1=3.841    3=7.815    5=11.070

2=5.991    4=9.488

Three competencies were found to be significantly different in the reporting of the two groups.

### Instruction

In this category are included structuring, motivating, and reinforcing students, providing for feedback, presenting information, and conducting learning activities. Using the Hebert model,<sup>64</sup> the competencies were divided into two areas--Content and Methodologies/Techniques. Questionnaire III sent to the three groups listed 49 competencies in the Content area of the Instruction category and 38 competencies in the Methodologies/Techniques area of the Instruction category.

Content. Table 26 shows the chi-square values of the differences and similarities between the high school and junior college teachers in addition to the percentages of responses for the two groups.

Significant difference was found in the reporting of the two groups on five of the competencies.

Only two Content competencies were rated crucial by high school and junior college teachers. These were:

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<sup>64</sup>Hebert, op. cit.

Table 26

Instruction (Content) Competencies as Indicated by High School and  
Junior College Teachers, Including Degrees of Freedom,  
Chi-Square, and Percentages of Responses

| No. | DF | Chi-Square | High School Teachers (19) |    |    |    |    |    | Junior College Teachers (44) |    |    |    |    |    |
|-----|----|------------|---------------------------|----|----|----|----|----|------------------------------|----|----|----|----|----|
|     |    |            | C                         | H  | D  | N  | I  | X  | C                            | H  | D  | N  | I  | X  |
| 1   | 2  | 4.31       | 11                        | 79 | 11 | -- | -- | -- | 12                           | 49 | 40 | -- | -- | -- |
| 2   | 2  | 1.33       | 74                        | 26 | -- | -- | -- | -- | 52                           | 43 | 5  | -- | -- | -- |
| 3   | 2  | 1.81       | 79                        | 16 | -- | -- | 5  | -- | 63                           | 37 | -- | -- | -- | -- |
| 4   | 2  | .63        | 32                        | 68 | -- | -- | -- | -- | 28                           | 63 | 9  | -- | -- | -- |
| 5   | 2  | .00        | 37                        | 63 | -- | -- | -- | -- | 36                           | 61 | 2  | -- | -- | -- |
| 6   | 3  | 5.01       | 26                        | 42 | 26 | 5  | -- | -- | 9                            | 26 | 63 | 2  | -- | -- |
| 7   | 2  | 2.93       | 26                        | 68 | 5  | -- | -- | -- | 30                           | 44 | 26 | -- | -- | -- |
| 8*  | 2  | 6.39       | 11                        | 89 | -- | -- | -- | -- | 26                           | 51 | 23 | -- | -- | -- |
| 9   | 3  | 2.02       | 21                        | 63 | 16 | -- | -- | -- | 14                           | 45 | 38 | 2  | -- | -- |
| 10  | 4  | 6.54       | 16                        | 68 | 11 | -- | 5  | -- | 9                            | 35 | 47 | 5  | 5  | -- |
| 11  | 4  | 7.49       | 21                        | 68 | 11 | -- | -- | -- | 7                            | 37 | 40 | 14 | 2  | -- |
| 12  | 3  | 1.62       | 11                        | 79 | 11 | -- | -- | -- | 26                           | 56 | 16 | 2  | -- | -- |
| 13* | 4  | 20.39      | 11                        | 5  | 68 | 16 | -- | -- | 9                            | 16 | 9  | 40 | 26 | -- |
| 14  | 3  | .51        | 5                         | 26 | 68 | -- | -- | -- | --                           | 33 | 60 | 7  | -- | -- |
| 15  | 2  | 2.26       | 11                        | 26 | 63 | -- | -- | -- | 19                           | 44 | 37 | -- | -- | -- |
| 16  | 2  | 5.51       | 26                        | 74 | -- | -- | -- | -- | 57                           | 36 | 7  | -- | -- | -- |

\*Significant Difference at the .05 Level

1=3.841    3=7.815    5=11.070

2=5.991    4=9.448

Table 26 continued

| No.  | DF | Chi-Square | High School Teachers (19) |    |    |    |    |    | Junior College Teachers (44) |    |    |    |    |    |
|------|----|------------|---------------------------|----|----|----|----|----|------------------------------|----|----|----|----|----|
|      |    |            | C                         | H  | D  | N  | I  | X  | C                            | H  | D  | N  | I  | X  |
| 17   | 3  | 3.04       | 16                        | 63 | 21 | -- | -- | -- | 12                           | 37 | 44 | 7  | -- | -- |
| 18   | 2  | .86        | 16                        | 68 | 16 | -- | -- | -- | 30                           | 53 | 16 | -- | -- | -- |
| 19   | 3  | .92        | --                        | 44 | 56 | -- | -- | -- | 7                            | 53 | 37 | 2  | -- | -- |
| 20   | 3  | 1.21       | 5                         | 31 | 58 | 5  | -- | -- | 12                           | 44 | 37 | 7  | -- | -- |
| 21   | 2  | 2.30       | 5                         | 74 | 21 | -- | -- | -- | 23                           | 51 | 26 | -- | -- | -- |
| 22*  | 4  | 10.10      | 5                         | 63 | 26 | -- | -- | 5  | 12                           | 19 | 60 | 9  | -- | -- |
| 23*  | 3  | 7.93       | 11                        | 5  | 79 | 5  | -- | -- | 21                           | 37 | 37 | 5  | -- | -- |
| 24   | 3  | 1.83       | --                        | 21 | 79 | -- | -- | -- | 9                            | 23 | 58 | 9  | -- | -- |
| 25   | 4  | 4.27       | --                        | 33 | 50 | 6  | -- | 11 | 19                           | 36 | 38 | 7  | -- | -- |
| 26   | 4  | 8.06       | 5                         | 5  | 74 | 11 | -- | 5  | 7                            | 47 | 40 | 7  | -- | -- |
| 27   | 4  | 2.31       | 11                        | 11 | 58 | 16 | -- | 5  | 10                           | 33 | 50 | 7  | -- | -- |
| 28   | 2  | 2.31       | 21                        | 68 | 11 | -- | -- | -- | 37                           | 42 | 21 | -- | -- | -- |
| 29   | 4  | 7.33       | --                        | 63 | 32 | -- | -- | 5  | 2                            | 24 | 67 | 7  | -- | -- |
| 30   | 5  | .81        | 5                         | 58 | 26 | -- | 5  | 5  | 16                           | 49 | 28 | 5  | 2  | -- |
| 31.1 | 2  | .25        | 26                        | 63 | 11 | -- | -- | -- | 35                           | 51 | 14 | -- | -- | -- |
| 31.2 | 2  | 2.80       | 16                        | 79 | 5  | -- | -- | -- | 28                           | 51 | 21 | -- | -- | -- |
| 31.3 | 4  | 6.88       | 11                        | 47 | 26 | 5  | -- | 11 | 5                            | 20 | 58 | 18 | -- | -- |
| 31.4 | 5  | 4.08       | 5                         | 5  | 68 | 11 | -- | 11 | 12                           | 19 | 45 | 21 | 2  | -- |
| 31.5 | 4  | 6.47       | 5                         | 5  | 68 | 16 | -- | 5  | 28                           | 26 | 37 | 9  | -- | -- |
| 31.6 | 4  | 2.13       | 5                         | 5  | 63 | 16 | -- | 11 | 5                            | 14 | 65 | 16 | -- | -- |

\*Significant Difference at the .05 Level

1=3.841    3=7.815    5=11.070

2=5.991    4=9.488

Table 26 continued

| No.   | DF | Chi-Square | High School Teachers (19) |    |    |    |    |    | Junior College Teachers (44) |    |    |    |    |    |
|-------|----|------------|---------------------------|----|----|----|----|----|------------------------------|----|----|----|----|----|
|       |    |            | C                         | H  | D  | N  | I  | X  | C                            | H  | D  | N  | I  | X  |
| 31.7  | 4  | 2.12       | 5                         | 32 | 42 | 11 | -- | 11 | 12                           | 23 | 51 | 14 | -- | -- |
| 31.8  | 4  | 4.26       | 5                         | 42 | 26 | 16 | -- | 11 | 14                           | 28 | 51 | 7  | -- | -- |
| 31.9  | 5  | 1.95       | 5                         | 5  | 68 | 16 | -- | 5  | 10                           | 18 | 43 | 20 | 5  | 5  |
| 31.10 | 5  | 1.32       | 5                         | -- | 47 | 37 | -- | 11 | --                           | 5  | 37 | 53 | 2  | 2  |
| 31.11 | 5  | 6.99       | 5                         | -- | 21 | 63 | -- | 11 | --                           | 5  | 58 | 35 | 2  | -- |
| 31.12 | 5  | 2.25       | 5                         | -- | 47 | 37 | -- | 11 | --                           | 5  | 44 | 49 | 2  | -- |
| 31.13 | 5  | 1.41       | 5                         | 11 | 68 | 11 | -- | 5  | 7                            | 21 | 49 | 16 | 7  | -- |
| 32    | 5  | 8.49       | --                        | 6  | 17 | 44 | 22 | 11 | 17                           | 14 | 10 | 10 | 36 | 14 |
| 33    | 2  | .98        | 26                        | 68 | 5  | -- | -- | -- | 33                           | 51 | 16 | -- | -- | -- |
| 34    | 2  | 1.02       | 16                        | 68 | 16 | -- | -- | -- | 26                           | 49 | 26 | -- | -- | -- |
| 35*   | 2  | 16.29      | --                        | 74 | 26 | -- | -- | -- | 58                           | 37 | 5  | -- | -- | -- |
| 36    | 4  | 2.13       | --                        | 5  | 84 | 5  | -- | 5  | --                           | 16 | 63 | 19 | 2  | -- |
| 37    | 4  | .78        | 5                         | 16 | 63 | 11 | -- | 5  | --                           | 9  | 70 | 21 | -- | -- |

\*Significant Difference at the .05 Level

1=3.841    3=7.815    5=11.070

2=5.991    4=9.488

Competency No. 2, "Knowledge of data processing terminology"; and Competency No. 3, "Knowledge and application of data processing function."

The following competencies were believed by both groups to be highly desirable:

1. Knowledge of data processing history.
4. Development of problem-solving ability.
5. Knowledge and function of automated data processing.
7. Knowledge of use of punched cards.
8. Knowledge of record planning and layout for various mediums.
9. Ability to keypunch information in cards.
12. Knowledge of process of printing, calculating, and preparing reports.
18. Knowledge about information storage and retrieval.
21. Knowledge of documentation standards.
28. Knowledge of computer execution of a program.
30. Knowledge of computer language hierarchy.
31. Knowledge of computer languages and relative importance of each:
  - 31.1 COBOL
  - 31.2 Fortran

33. Knowledge of input/output media.

34. Knowledge of report design.

Methodologies/Techniques. A comparison of responses by high school and junior college teachers in Methodologies/Techniques competencies, including chi-square and percentages of responses, is given in Table 27.

Five competencies were found to be significantly different in the reporting of the two groups.

Competency No. 2.9, "Ability to demonstrate the computer"; and Competency No. 7, "Ability to demonstrate flow charting," were rated by the consensus of both groups as crucial.

The following competencies in the Instruction--Methodologies/Techniques category were considered by high school and junior college teachers to be highly desirable.

1. Application of psychological principles of learning regarding:
  - 1.1 Favorable environment
  - 1.2 Motivation
  - 1.3 Practice
  - 1.5 Whole vs. part learning
2. Ability to demonstrate:
  - 2.2 Sorter
  - 2.4 Key punch

Table 27

Instruction (Methodologies/Techniques) Competencies as Indicated by  
High School and Junior College Teachers, Including Degrees  
of Freedom, Chi-Square, and Percentages of Responses

| No.  | DF | Chi-Square | High School Teachers (19) |    |    |    |    |    | Junior College Teachers (44) |    |    |    |    |    |
|------|----|------------|---------------------------|----|----|----|----|----|------------------------------|----|----|----|----|----|
|      |    |            | C                         | H  | D  | N  | I  | X  | C                            | H  | D  | N  | I  | X  |
| 1.1* | 2  | 8.47       | 21                        | 68 | 11 | -- | -- | -- | --                           | 63 | 37 | -- | -- | -- |
| 1.2  | 2  | 2.77       | 16                        | 79 | 5  | -- | -- | -- | 7                            | 65 | 28 | -- | -- | -- |
| 1.3  | 3  | 3.24       | 26                        | 63 | 11 | -- | -- | -- | 21                           | 56 | 2  | 21 | -- | -- |
| 1.4* | 3  | 13.90      | 19                        | 81 | 1  | -- | -- | -- | 2                            | 37 | 56 | 5  | -- | -- |
| 1.5  | 2  | 5.72       | 11                        | 79 | 11 | -- | -- | -- | 10                           | 45 | 45 | -- | -- | -- |
| 1.6* | 3  | 22.70      | 86                        | 14 | -- | -- | -- | -- | 12                           | 50 | 36 | -- | 2  | -- |
| 2.1* | 4  | 9.80       | 11                        | 74 | 11 | 5  | -- | -- | 9                            | 28 | 49 | 9  | -- | 5  |
| 2.2  | 4  | 4.12       | 11                        | 74 | 11 | 5  | -- | -- | 12                           | 40 | 30 | 14 | -- | 5  |
| 2.3  | 4  | 1.35       | 5                         | 16 | 42 | 32 | -- | 5  | 7                            | 21 | 52 | 14 | -- | 5  |
| 2.4  | 2  | .62        | 26                        | 63 | 11 | -- | -- | -- | 23                           | 53 | 23 | -- | -- | -- |
| 2.5  | 4  | .86        | 5                         | 21 | 58 | 11 | -- | 5  | 7                            | 35 | 42 | 12 | -- | 5  |
| 2.6  | 4  | .16        | 5                         | 26 | 58 | 5  | -- | 5  | 7                            | 28 | 49 | 12 | -- | 5  |
| 2.7  | 4  | .18        | 5                         | 16 | 58 | 16 | -- | 5  | 7                            | 21 | 47 | 21 | -- | 5  |
| 2.8  | 4  | 1.08       | 5                         | 42 | 42 | 5  | -- | 5  | 16                           | 33 | 51 | -- | -- | -- |
| 2.9  | 4  | .02        | 58                        | 32 | 5  | 5  | -- | -- | 51                           | 34 | 7  | 5  | 2  | -- |
| 3    | 2  | .48        | 16                        | 79 | 5  | -- | -- | -- | 21                           | 65 | 14 | -- | -- | -- |

\*Significant Difference at the .05 Level

1=3.841    3=7.815    5=11.070

2=5.991    4=9.488

Table 27 continued

| No.  | DF | Chi-Square | High School Teachers (19) |    |    |    |    |    | Junior College Teachers (44) |    |    |    |    |    |
|------|----|------------|---------------------------|----|----|----|----|----|------------------------------|----|----|----|----|----|
|      |    |            | C                         | H  | D  | N  | I  | X  | C                            | H  | D  | N  | I  | X  |
| 4.1  | 2  | 4.05       | 11                        | 84 | 5  | -- | -- | -- | 30                           | 51 | 19 | -- | -- | -- |
| 4.2* | 2  | 6.10       | --                        | 84 | 16 | -- | -- | -- | 32                           | 55 | 14 | -- | -- | -- |
| 4.3  | 4  | 4.67       | --                        | 53 | 37 | -- | -- | 11 | 7                            | 30 | 51 | 12 | -- | -- |
| 4.4  | 5  | 3.41       | 5                         | -- | 63 | 21 | -- | 11 | 12                           | 14 | 55 | 17 | 2  | -- |
| 4.5  | 4  | 5.84       | 5                         | 5  | 63 | 16 | -- | 11 | 16                           | 30 | 42 | 17 | -- | -- |
| 4.6  | 4  | 1.40       | --                        | -- | 79 | 16 | -- | 5  | 5                            | 12 | 65 | 19 | -- | -- |
| 4.7  | 4  | 4.22       | --                        | 26 | 53 | 11 | -- | 11 | 16                           | 14 | 58 | 12 | -- | -- |
| 4.8  | 4  | 4.14       | --                        | 21 | 53 | 16 | -- | 11 | 14                           | 23 | 58 | 5  | -- | -- |
| 4.9  | 5  | 1.97       | 5                         | -- | 68 | 22 | -- | 5  | 15                           | 8  | 45 | 23 | 8  | 3  |
| 4.10 | 4  | 2.49       | --                        | -- | 58 | 32 | -- | 11 | --                           | 2  | 45 | 48 | 5  | -- |
| 4.11 | 4  | 2.12       | --                        | 5  | 53 | 32 | -- | 11 | --                           | 7  | 47 | 44 | 2  | -- |
| 4.12 | 4  | 4.58       | --                        | -- | 63 | 26 | -- | 11 | --                           | 5  | 40 | 53 | 2  | -- |
| 4.13 | 4  | 2.50       | --                        | 26 | 63 | 5  | -- | 5  | 5                            | 12 | 58 | 23 | -- | 2  |
| 5    | 3  | .50        | 21                        | 68 | 11 | -- | -- | -- | 21                           | 56 | 21 | -- | 2  | -- |
| 6    | 4  | 2.88       | 11                        | 79 | 5  | -- | -- | 5  | 23                           | 53 | 21 | 2  | -- | -- |
| 7    | 2  | .12        | 63                        | 37 | -- | -- | -- | -- | 53                           | 42 | 5  | -- | -- | -- |
| 8    | 2  | .94        | 5                         | 89 | 5  | -- | -- | -- | 16                           | 72 | 12 | -- | -- | -- |
| 9    | 3  | .35        | 26                        | 58 | 16 | -- | -- | -- | 16                           | 58 | 23 | -- | -- | 2  |
| 10   | 2  | 3.17       | 11                        | 79 | 11 | -- | -- | -- | 26                           | 49 | 26 | -- | -- | -- |
| 11   | 4  | 3.34       | --                        | 11 | 68 | 11 | -- | 11 | 9                            | 30 | 47 | 12 | -- | 2  |
| 12   | 2  | 2.71       | 16                        | 21 | 63 | -- | -- | -- | 14                           | 47 | 40 | -- | -- | -- |
| 13   | 4  | 6.67       | 5                         | 68 | 21 | 5  | -- | -- | 7                            | 28 | 51 | 12 | -- | 2  |

\*Significant Difference at the .05 Level

1=3.841    3=7.815    5=11.070

2=5.991    4=9.488

3. Ability to enrich classroom presentation with cards, tapes, etc., used in actual business practice.
4. Ability to teach computer (programming) languages:
  - 4.1 COBOL
  - 4.2 Fortran
5. Ability to demonstrate various input/output media.
6. Ability to present systems design for data processing application.
8. Ability to demonstrate input planning.
9. Ability to transfer unit-record concepts to computer concepts.
10. Ability to relate personal business experience in data processing to classroom activities.

"Application of psychological principles of learning regarding whole vs. part learning," Competency No. 1.5, was considered highly desirable by 79 percent of the high school teachers. A bimodal consensus was reported for junior college teachers. Forty-five percent rated the competency highly desirable and 45 percent rated it desirable.

### Communication

Communication competencies are those involving the operation of hardware (audio-visual equipment) and initiating and responding verbally and nonverbally. Sixteen competencies were listed in the category on Questionnaire III.

Table 28 shows the chi-square values obtained for differences in responses between high school and junior college teachers regarding Communication competencies and the percentages of responses obtained from both groups.

Significant differences were found in the reporting of the two groups on five competencies.

Although none of the sixteen Communication competencies were rated crucial by the reporting of high school and junior college teachers, seven competencies were rated as highly desirable by the two groups. These were:

1. Effective speaking skills.
2. Proper questioning techniques.
3. Familiarity with several media for use in teaching data processing and knowledge of relative value of each:
  - 3.1 Chalkboard
  - 3.2 Overhead projector
5. Use of feedback from interaction for improved teaching.
6. Understanding the importance of nonverbal communication.
7. Ability to use nonverbal communication.

Table 28

Communication Competencies as Indicated by High School and  
Junior College Teachers, Including Degrees of Freedom,  
Chi-Square, and Percentages of Responses

| No.  | DF | Chi-Square | High School Teachers (19) |    |    |    |    |    | Junior College Teachers (44) |    |    |    |    |    |
|------|----|------------|---------------------------|----|----|----|----|----|------------------------------|----|----|----|----|----|
|      |    |            | C                         | H  | D  | N  | I  | X  | C                            | H  | D  | N  | I  | X  |
| 1    | 2  | .49        | 16                        | 79 | 5  | -- | -- | -- | 28                           | 67 | 5  | -- | -- | -- |
| 2    | 2  | 1.13       | 5                         | 95 | -- | -- | -- | -- | 16                           | 77 | 7  | -- | -- | -- |
| 3.1  | 2  | 1.19       | 21                        | 79 | -- | -- | -- | -- | 30                           | 61 | 9  | -- | -- | -- |
| 3.2  | 2  | 1.04       | 11                        | 84 | 5  | -- | -- | -- | 21                           | 65 | 14 | -- | -- | -- |
| 3.3  | 4  | 3.01       | 5                         | 63 | 26 | -- | -- | 5  | 2                            | 40 | 49 | 9  | -- | -- |
| 3.4  | 4  | 2.19       | --                        | 53 | 37 | 5  | -- | 5  | 2                            | 30 | 58 | 9  | -- | -- |
| 3.5  | 5  | 5.99       | 5                         | 68 | 21 | -- | -- | 5  | 5                            | 33 | 42 | 9  | 12 | -- |
| 3.6* | 3  | 14.26      | 16                        | 74 | 5  | 5  | -- | -- | 8                            | 26 | 63 | 2  | -- | -- |
| 3.7* | 3  | 16.14      | 16                        | 68 | 16 | -- | -- | -- | 5                            | 19 | 74 | 2  | -- | -- |
| 3.8* | 4  | 17.19      | 5                         | 68 | 21 | -- | -- | 5  | 5                            | 14 | 77 | 5  | -- | -- |
| 3.9* | 3  | 9.96       | 5                         | 68 | 21 | 5  | -- | -- | 2                            | 23 | 63 | 12 | -- | -- |
| 4    | 3  | 5.78       | 18                        | 71 | 12 | -- | -- | -- | 42                           | 30 | 26 | 2  | -- | -- |
| 5    | 2  | 4.64       | 10                        | 79 | 11 | -- | -- | -- | 33                           | 51 | 16 | -- | -- | -- |
| 6    | 4  | 8.83       | 5                         | 90 | 5  | -- | -- | -- | 12                           | 58 | 26 | 2  | 2  | -- |
| 7    | 4  | 8.83       | 5                         | 90 | 5  | -- | -- | -- | 9                            | 58 | 28 | 3  | 2  | -- |
| 8*   | 2  | 23.54      | 26                        | 74 | -- | -- | -- | -- | 72                           | 21 | 7  | -- | -- | -- |

\*Significant Difference at the .05 Level

1=3.841    3=7.815    5=11.070

2=5.991    4=9.488

### Evaluation

Included in this category are selecting and assessing instruments, diagnosing student difficulties or abilities, and involving the students in self-evaluation. Questionnaire III contained eight competencies in the Evaluation area.

Chi-square values obtained for difference in responses between high school and junior college teachers as well as percentages of responses obtained from the two groups regarding Evaluation competencies are shown in Table 29.

Although none of the Evaluation competencies were rated crucial by high school and junior college teachers, seven of the eight competencies in this area were rated by both groups as highly desirable. They were:

1. Selection of valid and reliable measurement techniques.
2. Construction of valid and reliable measurement techniques.
3. Use of pretest and posttest when applicable.
4. Self-evaluation of teacher techniques and methods for self-improvement purposes.
6. Use of student self-evaluation of his learning whenever feasible.
7. Ability to diagnose student difficulties.
8. Ability to apply appropriate remedial techniques.

Table 29

Evaluation Competencies as Indicated by High School and Junior  
College Teachers, Including Degrees of Freedom,  
Chi-Square, and Percentages of Responses

| No. | DF | Chi-Square | High School Teachers (19) |    |    |    |    |    | Junior College Teachers (44) |    |    |    |    |    |
|-----|----|------------|---------------------------|----|----|----|----|----|------------------------------|----|----|----|----|----|
|     |    |            | C                         | H  | D  | N  | I  | X  | C                            | H  | D  | N  | I  | X  |
| 1   | 3  | 1.73       | 11                        | 79 | 11 | -- | -- | -- | 3                            | 64 | 30 | 3  | -- | -- |
| 2   | 3  | 3.54       | 11                        | 79 | 11 | -- | -- | -- | 23                           | 47 | 28 | 2  | -- | -- |
| 3   | 4  | 1.31       | 5                         | 63 | 21 | 5  | -- | 5  | 14                           | 47 | 35 | 5  | -- | -- |
| 4   | 2  | 3.45       | 5                         | 84 | 11 | -- | -- | -- | 30                           | 67 | 2  | -- | -- | -- |
| 5*  | 2  | 6.87       | --                        | 42 | 53 | 5  | -- | -- | 23                           | 56 | 21 | -- | -- | -- |
| 6   | 3  | 3.68       | --                        | 89 | 11 | -- | -- | -- | 14                           | 58 | 26 | 2  | -- | -- |
| 7   | 2  | 1.12       | 11                        | 84 | 5  | -- | -- | -- | 27                           | 73 | -- | -- | -- | -- |
| 8   | 2  | .43        | 11                        | 79 | 11 | -- | -- | -- | 21                           | 69 | 10 | -- | -- | -- |

\*Significant Difference at the .05 Level

1=3.841    3=7.815    5=11.070

2=5.991    4=9.488

Only Competency No. 5, "Student evaluation of teacher techniques and methods for purposes of teacher improvement," was significantly different in the reporting of the two groups. High school teachers, 58 percent, rated this a desirable competency, and junior college teachers, 56 percent, considered it to be a highly desirable competency.

### Developing Pupil-Self

Included in this category are developing pupil-self concept, social interaction skills, learning-to-learn skills, and acceptance of responsibility. This general category is included in this study as it is part of the Dodl categories<sup>65</sup> and because the introductory data processing teacher has the opportunity to develop pupil-self concept.

Table 30 shows the chi-square values of the differences and similarities between the responses of high school and junior college teachers to Developing Pupil-Self competencies. Percentages of responses are also shown for the two groups.

None of the fourteen competencies in the Developing Pupil-Self category were believed to be crucial by both high school and junior college teachers.

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<sup>65</sup>Dodl, op. cit.

Table 30

Developing Pupil-Self Competencies as Indicated by High School and  
Junior College Teachers, Including Degrees of Freedom,  
Chi-Square and Percentages of Responses

| No. | DF | Chi-Square | High School Teachers (19) |    |    |    |    |    | Junior College Teachers (44) |    |    |    |    |    |
|-----|----|------------|---------------------------|----|----|----|----|----|------------------------------|----|----|----|----|----|
|     |    |            | C                         | H  | D  | N  | I  | X  | C                            | H  | D  | N  | I  | X  |
| 1   | 3  | .93        | 21                        | 74 | 5  | -- | -- | -- | 16                           | 63 | 19 | -- | 2  | -- |
| 2   | 2  | .85        | 5                         | 84 | 11 | -- | -- | -- | 9                            | 67 | 23 | -- | -- | -- |
| 3   | 2  | 1.12       | 16                        | 79 | 5  | -- | -- | -- | 19                           | 63 | 19 | -- | -- | -- |
| 4   | 2  | 5.30       | 16                        | 84 | -- | -- | -- | -- | 39                           | 48 | 14 | -- | -- | -- |
| 5   | 2  | 2.67       | 11                        | 89 | -- | -- | -- | -- | 28                           | 63 | 9  | -- | -- | -- |
| 6   | 2  | 3.31       | --                        | 95 | 5  | -- | -- | -- | 16                           | 67 | 16 | -- | -- | -- |
| 7   | 1  | .00        | --                        | 79 | 21 | -- | -- | -- | --                           | 44 | 56 | -- | -- | -- |
| 8*  | 2  | 18.98      | --                        | 79 | 21 | -- | -- | -- | --                           | 21 | 70 | 7  | 2  | -- |
| 9   | 3  | 4.40       | --                        | 21 | 74 | 5  | -- | -- | --                           | 30 | 40 | 19 | 11 | -- |
| 10  | 2  | 2.79       | 21                        | 68 | 11 | -- | -- | -- | 28                           | 42 | 30 | -- | -- | -- |
| 11  | 2  | 1.12       | 21                        | 74 | 5  | -- | -- | -- | 23                           | 58 | 19 | -- | -- | -- |
| 12* | 2  | 11.65      | 26                        | 74 | -- | -- | -- | -- | 60                           | 23 | 16 | -- | -- | -- |
| 13  | 2  | 4.31       | 16                        | 74 | 11 | -- | -- | -- | 37                           | 40 | 23 | -- | -- | -- |
| 14  | 3  | 6.08       | 63                        | 32 | 5  | -- | -- | -- | 24                           | 56 | 17 | 2  | -- | -- |

\*Significant Difference at the .05 Level

1=3.841    3=7.815    5=11.070  
2=5.991    4=9.488

Only two of the Developing Pupil-Self competencies were found to be significantly different in the reported responses of the two groups.

Nine of the fourteen competencies in the Developing Pupil-Self category were rated as highly desirable by a consensus of high school and junior college teachers. They were:

1. Assisting student in accepting responsibility of reaching his goals. (e.g., correct homework procedures, practice, etc.)
2. Development of ability in student to accept constructive criticism.
3. Development of ability in student to work under pressure.
4. Development in student of a respect for time, property, and rights of others.
5. Development of self-confidence in student's own ability.
6. Guidance regarding data processing as a vocational possibility, or work with counselor to provide services.
10. Development of ability to work independently through good study habits.
11. Development of ability in student to persevere.
13. Development of ability to use reference materials.

### Personal Attributes

The Personal Attributes category includes accepting self, evaluating and improving self, planning for one's self improvement, and solving problems. The area also includes interacting with others--both students and peers.

Table 31 illustrates the chi-square values and percentages of responses to Personal Attributes competencies by high school and junior college respondents.

Only Competency No. 10, "Establishment of proper teacher behavior as an example to students," was rated crucial by high school and junior college teachers. A bimodal consensus was reported for junior college teachers. Forty percent of the teachers considered the competency a crucial one, while 40 percent believed the competency to be highly desirable.

Ten of the thirteen competencies in the Personal Attributes category were rated highly desirable by a consensus of both groups. They were:

2. Establishment of rapport that reflects a positive influence upon pupils.
3. Counseling of students concerning their individual problems.
4. Sensitivity to students' learning problems.
5. Establishment of rapport with administrative and supervisory personnel.
7. Establishing a need for creativity.

Table 31

Personal Attributes Competencies as Indicated by High School and  
Junior College Teachers, Including Degrees of Freedom,  
Chi-Square and Percentages of Responses

| No. | DF | Chi-Square | High School Teachers (19) |    |    |    |    |    | Junior College Teachers (44) |    |    |    |    |    |
|-----|----|------------|---------------------------|----|----|----|----|----|------------------------------|----|----|----|----|----|
|     |    |            | C                         | H  | D  | N  | I  | X  | C                            | H  | D  | N  | I  | X  |
| 1   | 2  | 5.82       | 16                        | 79 | 5  | -- | -- | -- | 48                           | 40 | 12 | -- | -- | -- |
| 2   | 2  | 1.19       | 21                        | 79 | -- | -- | -- | -- | 30                           | 61 | 9  | -- | -- | -- |
| 3   | 3  | 2.11       | 11                        | 68 | 16 | -- | 5  | -- | 14                           | 49 | 37 | -- | -- | -- |
| 4   | 2  | 1.33       | 16                        | 79 | 5  | -- | -- | -- | 26                           | 58 | 16 | -- | -- | -- |
| 5   | 3  | 1.23       | 17                        | 72 | 6  | -- | 6  | -- | 12                           | 67 | 21 | -- | -- | -- |
| 6   | 3  | .33        | 47                        | 42 | 11 | -- | -- | -- | 35                           | 51 | 12 | -- | -- | 2  |
| 7   | 4  | 8.29       | --                        | 89 | 11 | -- | -- | -- | 19                           | 43 | 33 | 2  | 2  | -- |
| 8   | 3  | 1.87       | 21                        | 74 | 5  | -- | -- | -- | 40                           | 49 | 9  | 2  | -- | -- |
| 9   | 2  | 1.52       | 21                        | 79 | -- | -- | -- | -- | 19                           | 67 | 14 | -- | -- | -- |
| 10  | 2  | 3.20       | 69                        | 26 | 5  | -- | -- | -- | 40                           | 40 | 20 | -- | -- | -- |
| 11  | 3  | 4.88       | 16                        | 84 | -- | -- | -- | -- | 45                           | 48 | 5  | -- | -- | 2  |
| 12  | 4  | 1.06       | 11                        | 79 | 11 | -- | -- | -- | 21                           | 57 | 14 | 5  | -- | 2  |
| 13  | 3  | .42        | 11                        | 79 | 11 | 5  | -- | -- | 21                           | 64 | 12 | 2  | -- | -- |

\*Significant Difference at the .05 Level

1=3.841    3=7.815    5=11.070

2=5.991    4=9.488

8. Establishment of a positive attitude toward the teaching of data processing.
9. Ability to use patience with slow learners.
11. Provision for continuous learning and updating.
12. Development of total dedication to teaching.
13. Participation in in-service data processing conferences and workshops.

### SUMMARY

This chapter contained a description of the populations participating in this study, together with the examination and explanation of the data obtained from the questionnaires. These questionnaires were administered to business education authorities in the data processing area, high school data processing teachers, and junior college data processing teachers. Chi-square values were computed for each competency as well as percentages of responses obtained from the three groups.

## Chapter 5

### SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

This study was designed to determine the perceptions and differences in perceptions of business education authorities in the area of data processing, high school data processing teachers, and junior college data processing teachers concerning the importance of listed competencies needed for effective teaching of an introductory data processing course.

### SUMMARY

Determination of these perceptions and differences in perceptions was accomplished by (1) developing a list of competencies needed by the introductory data processing teacher, (2) polling business education authorities in the area of data processing, Texas high school data processing teachers, and Texas junior college data processing teachers to obtain their rankings of the list of competencies, (3) analyzing the responses of the three groups, and (4) drawing conclusions and making recommendations that may aid business educators in the preparation of data processing teachers.

Methods and procedures used in the collection and treatment of the data were discussed in Chapter 2. For purposes of this research, a modified Delphi technique was used.

Chapter 3 contained the review of the literature. This review was limited to business-teacher competencies and the effect of automation on business education. An adequacy of material concerning the effect of automation on business and education was found. However, only two studies and one journal article were found which directly related to business-teacher competencies. The search revealed no research which developed teacher competencies in the data processing area by using perceptions of business data processing authorities and high school and junior college classroom teachers.

Chapter 4 described the populations participating in this research, along with an examination and analysis of the data obtained from the questionnaires sent to the three groups. Chi-square values and percentages were computed for each competency to determine differences in the reporting of the three groups.

## CONCLUSIONS

Based on the findings of this study, three lists of competencies were developed. One list contained those competencies rated crucial and highly desirable by a modal consensus of authorities

and junior college teachers. The second list included those competencies rated crucial and highly desirable by a modal consensus of authorities and high school teachers. The third list contained competencies rated crucial and highly desirable by modal consensus of high school and junior college teachers. The three lists also included competencies which received a crucial or highly desirable rating by 50 percent or more of the respondents from either group, but which were outside the modal consensus.

#### Authorities and Junior College Teachers

The competencies that were rated crucial and highly desirable by authorities and junior college teachers are discussed here in terms of the number of competencies in each of the eight areas of Dodl's categories. For a complete list of the competencies, see Appendix M, page 212.

#### Planning

Only one Planning competency was rated crucial by a modal consensus of both groups, although eighteen additional competencies were rated highly desirable by the two groups. Another five competencies were ranked crucial by authorities and highly desirable by junior college teachers, while one other competency was considered highly desirable by authorities and desirable by junior college teachers. An additional three competencies were rated highly desirable by junior college teachers and desirable by authorities.

### Administration

Although none of the nine Administration competencies were rated crucial by a modal consensus of both groups, four were rated highly desirable by both groups. Additionally, one competency was rated highly desirable by junior college teachers and desirable by authorities.

### Instruction--Content

Four Content competencies were considered crucial, and twelve competencies were rated highly desirable by modal consensus of the two groups. Six added competencies were rated crucial by authorities and highly desirable by junior college teachers, while another three were believed to be highly desirable by authorities and desirable by junior college teachers.

### Instruction--Methodologies/Techniques

In the Methodologies/Techniques area of Instruction, two competencies were considered crucial and nine were rated highly desirable by modal consensus. However, another four competencies were rated crucial by authorities and highly desirable by junior college teachers, while one other competency was ranked highly desirable by junior college teachers and desirable by authorities.

### Communication

Two communication competencies were rated crucial and one was rated highly desirable by modal consensus of both groups. An additional six competencies were rated crucial by authorities and highly desirable by junior college teachers.

### Evaluation

None of the Evaluation competencies were rated as crucial by a modal consensus of the two groups, although six competencies were considered highly desirable by modal consensus of both groups. Another two competencies were rated crucial by authorities and highly desirable by junior college teachers.

### Developing Pupil-Self

In the Developing Pupil-Self area, one competency was believed to be crucial and four were considered highly desirable by a modal consensus of the two groups. An added six competencies were rated crucial by authorities and highly desirable by junior college teachers.

### Personal Attributes

Two Personal Attributes competencies were rated crucial, and two were rated highly desirable by modal consensus of both groups. Eight additional competencies were believed to be crucial by authorities and highly desirable by junior college teachers.

### Authorities and High School Teachers

The competencies that were rated as crucial and highly desirable by authorities and high school teachers are discussed here in terms of the number of competencies in each of the eight areas of Dodl's categories. For a complete list of the competencies, see Appendix N, page 223.

#### Planning

Two Planning competencies were rated crucial, and eighteen were rated highly desirable by modal consensus of authorities and high school teachers. An additional five competencies were believed to be crucial by authorities and highly desirable by high school teachers, while another seven competencies were rated highly desirable by high school teachers and desirable by authorities.

#### Administration

Of the nine competencies listed in the Administration category, only one was considered crucial by modal consensus, while four competencies were rated highly desirable by modal consensus. Two additional competencies were considered crucial by high school teachers and desirable by authorities, and another two competencies were rated highly desirable by high school teachers and desirable by authorities.

### Instruction--Content

Two competencies were rated crucial by modal consensus of authorities and high school teachers, and another eleven were believed to be highly desirable by modal consensus. Another five competencies were rated crucial by authorities and highly desirable by high school teachers, while an added seven competencies were considered highly desirable by high school teachers and desirable by authorities. Three other competencies were rated highly desirable by authorities and desirable by high school teachers.

### Instruction--Methodologies/Techniques

Although only one competency in the Methodologies/Techniques area of Instruction was rated crucial by modal consensus, six competencies were rated highly desirable by the two groups. Five competencies were rated crucial by authorities and highly desirable by high school teachers; two competencies were rated crucial by high school teachers and highly desirable by authorities; one competency was rated highly desirable by authorities and desirable by teachers; and seven competencies were rated highly desirable by high school teachers and desirable by authorities.

### Communication

Although none of the competencies in the Communication category were rated crucial by modal consensus, two competencies

were believed to be highly desirable by modal consensus of the two groups. Eight additional competencies were rated crucial by authorities and highly desirable by high school teachers, and another six competencies were considered highly desirable by high school teachers and desirable by authorities.

### Evaluation

None of the Evaluation competencies were rated crucial by a modal consensus of the two groups. However, four competencies were rated highly desirable by modal consensus, and an additional three competencies were rated crucial by authorities and highly desirable by high school teachers.

### Developing Pupil-Self

One competency in the Developing Pupil-Self category was ranked crucial by modal consensus of authorities and high school teachers. Another six competencies were believed to be highly desirable by modal consensus, and four other competencies were rated crucial by authorities and highly desirable by high school teachers. Two added competencies were considered highly desirable by high school teachers and desirable by authorities.

### Personal Attributes

Two competencies in the Personal Attributes area were ranked crucial by modal consensus, and two were rated highly desirable by modal consensus. Another nine competencies were considered crucial by authorities and highly desirable by high school teachers.

### Junior College and High School

The competencies that were rated as crucial and highly desirable by junior college and high school teachers are discussed here in terms of the number of competencies in each of the eight areas of Dodl's categories. For a complete list of the competencies, see Appendix O, page 237.

### Planning

Although only one Planning competency was believed to be crucial by a modal consensus of junior college and high school teachers, 25 competencies were considered highly desirable by modal consensus of the two groups. One additional competency was rated crucial by high school teachers and highly desirable by junior college teachers. Five added competencies were rated highly desirable by high school teachers and desirable by junior

college teachers, and one other competency was rated highly desirable by junior college teachers and desirable by high school teachers.

#### Administration

Although none of the Administration competencies were considered crucial by modal consensus of junior college and high school teachers, five competencies were rated highly desirable by modal consensus. Two competencies were rated crucial by high school teachers and highly desirable by junior college teachers, while one other competency was ranked highly desirable by high school teachers and desirable by junior college teachers.

#### Instruction--Content

Two competencies in the Content area of Instruction were believed to be crucial by modal consensus of junior college and high school teachers, and fifteen competencies were rated highly desirable by modal consensus. Two competencies were rated crucial by junior college teachers and highly desirable by high school teachers; five competencies were considered highly desirable by high school teachers and desirable by junior college teachers; and one other competency was rated highly desirable

by junior college teachers and desirable by high school teachers.

#### Instruction--Methodologies/Techniques

Two competencies in the Methodologies/Techniques area of Instruction were considered crucial by modal consensus of the two groups, and fourteen competencies were rated highly desirable by modal consensus. One other competency was rated crucial by high school teachers and highly desirable by junior college teachers, and four additional competencies were rated highly desirable by high school teachers and desirable by junior college teachers.

#### Communication

While none of the Communication competencies were ranked crucial by modal consensus of the two groups, seven competencies were rated highly desirable by modal consensus. Two competencies were rated crucial by junior college teachers and highly desirable by high school teachers, while seven competencies were rated highly desirable by high school teachers and desirable by junior college teachers.

#### Evaluation

Although none of the Evaluation competencies were rated crucial, seven competencies were believed to be highly desirable by modal consensus of the two groups. One added competency was rated highly desirable by junior college teachers and desirable by

high school teachers.

### Developing Pupil-Self

None of the competencies in the Developing Pupil-Self category were rated crucial by modal consensus of junior college and high school teachers, although nine were rated highly desirable by modal consensus. One competency was rated crucial by high school teachers and highly desirable by junior college teachers; one competency was rated crucial by junior college teachers and highly desirable by high school teachers; and two competencies were rated highly desirable by high school teachers and desirable by junior college teachers.

### Personal Attributes

Only one competency in the Personal Attributes area was rated crucial by modal consensus of junior college and high school teachers. However, ten of the competencies were believed to be highly desirable by modal consensus of the two groups. One added competency was rated highly desirable by junior college teachers and crucial by high school teachers, and one further competency was considered highly desirable by high school teachers and crucial by junior college teachers.

### Conflicting Opinions Among the Three Groups

Using a chi-square computation, significant differences at the .05 level of confidence were determined among the three groups. Convergent opinions far outnumbered divergent opinions.

High School and junior college teachers responded similarly to most competencies (88 percent). Only 22 significant differences (12 percent) were found in responses to 183 competencies.

Greater differences occurred between authorities and junior college teachers. Forty-one significant differences were found between the responses of the two groups to 183 competencies (22 percent).

Fifty-nine significant differences were found between the responses of authorities and high school teachers (32 percent).

A complete listing of significant differences can be seen in Appendix P, page 249.

### RECOMMENDATIONS

Based on the findings and conclusions of this study, the following recommendations are made for planning the curriculum of business-teacher education programs:

1. Attention should be given by business-teacher educators to those competencies rated crucial by high school teachers, junior college teachers, and business data processing authorities. Development of those competencies which are not now included in methods courses should be implemented.
2. Those competencies rated highly desirable by the three groups which are not now included in methods courses should also be added to the curriculum of data processing methods courses.
3. Those competencies rated crucial and/or highly desirable by 50 percent or more of either responding group should be considered as content for methods courses.
4. Curriculum materials based on the findings of this study should be incorporated in a methods textbook for introductory data processing teachers.
5. The competencies listed as crucial and highly desirable by the three groups participating

in this study should be subjected to validity studies to determine whether teachers possessing these competencies produce higher student achievement.

6. A further study should be undertaken which would result in behaviorally stated competencies.

APPENDIX A

Vital Statistics of the

Business Education Program in Texas

VITAL STATISTICS OF THE  
BUSINESS EDUCATION PROGRAM IN TEXAS  
GRADES 8-12  
1973-1974\*

| Course               | Pupils<br>Enrolled | Staff |
|----------------------|--------------------|-------|
| Bookkeeping I        | 35,295             | 1,020 |
| Bookkeeping II       | 1,628              | 67    |
| Record Keeping       | 9,065              | 219   |
| Business Math        | 9,003              | 247   |
| Business Com.        | 1,702              | 65    |
| Business Law         | 15,099             | 268   |
| Business Machines    | 3,746              | 60    |
| Business Office Exp. | 639                | 27    |
| Bus. Cler. Practice  | 3,847              | 144   |
| Bus. DP, Comp. Oper. | 986                | 29    |
| Bus. Org/Management  | 795                | 22    |
| Salesmanship         | 1,495              | 30    |
| General Business     | 27,063             | 545   |
| Shorthand I          | 19,467             | 827   |
| Shorthand II         | 1,637              | 95    |
| Per. Use Shorthand   | 673                | 15    |
| Secretarial Practice | 1,149              | 64    |
| Typewriting, Grade 8 | 14,679             | 217   |
| Typewriting I        | 132,180            | 2,035 |
| Typewriting II       | 27,484             | 948   |
| Other                | 5,327              | 113   |
| TOTALS               | 312,059            | 7,057 |

\*Obtained from the State Consultant in Business Education, Austin, Texas.

VITAL STATISTICS OF THE  
BUSINESS EDUCATION PROGRAM IN TEXAS

GRADES 8-12

1972-1973\*

| Course                        | Pupils<br>Enrolled | Staff        | Sections<br>Taught |
|-------------------------------|--------------------|--------------|--------------------|
| Bookkeeping I                 | 36,437             | 1,013        | 1,667              |
| Bookkeeping II                | 1,568              | 60           | 77                 |
| Record Keeping                | 9,968              | 211          | 388                |
| Business Arithmetic           | 10,323             | 252          | 433                |
| Bus. Com. (Bus. Eng.)         | 1,963              | 67           | 93                 |
| Business Law                  | 9,024              | 221          | 381                |
| Business Machines             | 2,280              | 42           | 102                |
| Business Office Exp.          | 742                | 23           | 40                 |
| Bus. Cler. Prac.              | 4,754              | 148          | 243                |
| Bus. DP, Comp. Oper.          | 760                | 27           | 42                 |
| Bus. Org/Management           | 370                | 10           | 16                 |
| Bus. Salesmanship             | 647                | 17           | 28                 |
| General Business              | 23,416             | 492          | 924                |
| Shorthand I                   | 21,262             | 871          | 1,246              |
| Shorthand II                  | 1,375              | 85           | 90                 |
| Per. Use Shorthand            | 214                | 8            | 11                 |
| Secretarial Practice          | 945                | 50           | 64                 |
| Typewriting, Grade 8          | 12,132             | 166          | 451                |
| Typewriting I                 | 138,391            | 2,059        | 5,044              |
| Typewriting II                | 30,484             | 974          | 1,497              |
| Other Business Educ.          | 5,185              | 103          | 225                |
| <b>TOTALS</b>                 | <b>312,240</b>     | <b>6,899</b> | <b>13,062</b>      |
| Vocational Office Coop        | 6,213              | 303          | 303                |
| Vocational Office Combination | 3,883              | 153          | 153                |
| Pre-Employment Laboratory     | 425                | 147          | 147                |
| <b>TOTALS</b>                 | <b>10,521</b>      | <b>603</b>   | <b>603</b>         |

\* Obtained from the State Consultant in Business Education, Austin, Texas.

October 1, 1969

VITAL STATISTICS OF THE BUSINESS EDUCATION PROGRAM IN TEXAS

GRADES 8-12

1968-1969

| COURSE<br>CODE<br>NUMBER | COURSE TITLE             | NUMBER OF SECTIONS |                               | PUPILS ENROLLED |                               | AVERAGE CLASS SIZE |                               | PER CENT OF<br>BUSINESS EDUCATION<br>ENROLLMENT |                               |
|--------------------------|--------------------------|--------------------|-------------------------------|-----------------|-------------------------------|--------------------|-------------------------------|-------------------------------------------------|-------------------------------|
|                          |                          | 1968-69            | + OR -<br>BASED ON<br>1967-68 | 1968-69         | + OR -<br>BASED ON<br>1967-68 | 1968-69            | + OR -<br>BASED ON<br>1967-68 | 1968-69                                         | + OR -<br>BASED ON<br>1967-68 |
| 03.01 01                 | Bookkeeping I            | 1,674              | 27-                           | 37,242          | 453-                          | 21.95              | .21-                          | 13.05                                           | .71-                          |
| 03.01 02                 | Bookkeeping II           | 71                 | 8-                            | 1,283           | 270-                          | 18.07              | 1.59-                         | .45                                             | .12-                          |
| 03.01 03                 | Record Keeping           | 233                | 139+                          | 5,842           | 3,572+                        | 25.07              | .94+                          | 2.05                                            | 1.22+                         |
| 03.02 01                 | Business Arithmetic      | 294                | 13+                           | 7,099           | 469+                          | 27.42              | 3.83+                         | 2.49                                            | .07+                          |
| 03.02 02                 | Business Communications  | 82                 | 3+                            | 1,778           | 12-                           | 21.68              | .98-                          | .62                                             | .03-                          |
| 03.02 03                 | Business Law             | 254                | 19+                           | 6,033           | 434+                          | 23.75              | .08-                          | 2.11                                            | .06+                          |
| 03.02 04                 | Business Machines        | 116                | 7+                            | 2,463           | 213+                          | 21.23              | .59+                          | .86                                             | .05+                          |
| 03.02 05                 | Bus. Office Experience   | 39                 | 5+                            | 777             | 172+                          | 19.92              | 2.13+                         | .27                                             | .04+                          |
| 03.02 06                 | Clerical Practice        | 238                | 26+                           | 4,561           | 467+                          | 19.16              | .15-                          | 1.60                                            | .11+                          |
| 03.02 07                 | Bus. D/P, Comp. Oper.    | 42                 | 31+                           | 658             | 410+                          | 15.67              | 6.88-                         | .23                                             | .13+                          |
| 03.02 08                 | Bus. Org./Management     | 11                 | 1+                            | 261             | 83+                           | 23.73              | 5.93+                         | .09                                             | .02+                          |
| 03.02 09                 | Salesmanship             | 26                 | 8+                            | 641             | 196+                          | 24.65              | .07-                          | .22                                             | .05+                          |
| 03.02 10                 | General Business         | 716                | 71+                           | 18,308          | 2,120+                        | 25.57              | .47+                          | 6.41                                            | .51+                          |
| 03.03 01                 | Shorthand I              | 1,286              | 6-                            | 22,821          | 618-                          | 15.75              | 2.39-                         | 7.99                                            | .56-                          |
| 03.03 02                 | Shorthand II             | 112                | 4-                            | 1,866           | 115-                          | 16.66              | .42-                          | .65                                             | .08-                          |
| 03.03 03                 | Personal Use Shorthand   | 7                  | 1-                            | 141             | 31-                           | 20.14              | 1.36-                         | .05                                             | .02-                          |
| 03.03 04                 | Secretarial Practice     | 87                 | 38-                           | 1,519           | 777-                          | 17.46              | .91-                          | .53                                             | .31-                          |
| 03.04 01                 | Typewriting Grade 8      | 282                | 1-                            | 7,400           | 614-                          | 26.24              | 2.08-                         | 2.59                                            | .30-                          |
| 03.04 02                 | Typewriting I            | 4,835              | 102+                          | 131,917         | 5,825+                        | 27.28              | .64+                          | 46.21                                           | .18+                          |
| 03.04 03                 | Typewriting II           | 1,475              | 50+                           | 30,685          | 572+                          | 20.80              | .33-                          | 10.75                                           | .24-                          |
| 03.99 99                 | Other Business Education | 92                 | 1+                            | 2,213           | 94-                           | 24.05              | 1.30-                         | .78                                             | .07-                          |
| TOTALS                   |                          | 11,972             | 391+                          | 285,508         | 11,549+                       | 21.72              | .20-                          | 100.00                                          |                               |

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## APPENDIX B

### Competencies Selected by Observations of Practicing Teachers

List of Competencies Selected by Observations  
of the Researcher

The teacher of introductory data processing should understand, demonstrate, and effect the following:

1. Facility at the blackboard.
2. Ability to use overhead projector effectively.
3. Knowledge of course content.
4. Ability to communicate knowledge to students.
5. Ability to speak effectively.
6. Ability to develop a lesson plan.
7. Ability to read the environment of the classroom and change the lesson plan accordingly.
8. Ability to use tape recorder.
9. Ability to use slide projector.
10. Ability to develop and maintain a bulletin board.
11. Knowledge of at least two machine languages.
12. Ability to develop supplementary materials to reinforce the text.
13. Knowledge of input/output systems.
14. Knowledge of computer math.
15. Knowledge of history of computers.
16. Ability to relate classroom experiences to business world.
17. Ability to keypunch.
18. Ability to demonstrate use of machinery.
19. Ability to diagnose student difficulties.

## APPENDIX C

### Bibliographical List Used to Determine Data Processing Competencies

## BIBLIOGRAPHY

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## APPENDIX D

Request to Classroom Teachers

for

Participation in the Study

Houston, Texas 77040

Your name has been submitted to me by the Texas Education Agency as a data processing teacher who might be willing to participate in a study establishing needed competencies for effective teaching of an introductory course in high school and junior college data processing. Your participation is a vital part of this study. The task will involve completing questionnaires on competencies and you will be furnished a synopsis of the completed doctoral disseration.

Please indicate your response on the attached card and mail it to me by October 1, 1974.

Sincerely yours,

Mrs. Nora Jo Sherman

njs

Enclosure

\_\_\_\_\_ Yes, I am willing to  
participate in your study.

\_\_\_\_\_ No, I am unable to  
participate in your study.

\_\_\_\_\_ Name

\_\_\_\_\_ School

\_\_\_\_\_ Address

Houston, Texas 77040

Your name has been submitted to me by South-Western Publishing Co. as a data processing teacher who might be willing to participate in a study establishing needed competencies for effective teaching of an introductory course in high school and junior college data processing. Your participation is a vital part of this study. The task will involve completing questionnaires on competencies and you will be furnished a synopsis of the completed doctoral dissertation.

Please indicate your response on the attached card and mail it to me by October 1, 1974.

Sincerely yours,

Mrs. Nora Jo Sherman

njs

Enclosure

\_\_\_\_\_ Yes, I am willing to  
participate in your study.

\_\_\_\_\_ No, I am unable to  
participate in your study.

\_\_\_\_\_  
Name

\_\_\_\_\_  
School

\_\_\_\_\_  
Address

## APPENDIX E

Letter of Request to Authorities

for

Participation in the Study

Houston, Texas 77040

In reviewing data processing literature, I have noted that you have written articles pertaining to data processing. Will you be willing to participate as an authority in a study establishing needed competencies for effective teaching of an introductory course in high school and junior college data processing? Your participation is a vital part of this study. The task will involve completing questionnaires on competencies, and you will be furnished a synopsis of the completed doctoral dissertation.

Please indicate your response on the attached card and mail it to me by October 1, 1974.

Sincerely yours,

Mrs. Nora Jo Sherman

njs

Enclosure

\_\_\_\_\_ Yes, I am willing to  
participate in your study.

\_\_\_\_\_ No, I am unable to  
participate in your study.

\_\_\_\_\_  
Name

\_\_\_\_\_  
School

\_\_\_\_\_  
Address

## APPENDIX F

### Cover Letter and Questionnaire I

Houston, Texas 77040  
October , 1974

Dear

Thank you for agreeing to participate in my study to establish needed competencies for effective teaching of an introductory course in data processing.

For purposes of this study, introductory data processing is defined as a survey course overviewing manual data processing, unit record data processing, and a brief introduction to electronic data processing. The time span covered can vary and equipment may or may not be used. The population from which this sample is drawn encompasses Texas high school and junior college data processing teachers as well as authorities who have published two or more data processing articles in the past six years.

The Delphi technique will be used to gather expert opinions by means of three questionnaires to which you will be asked to respond. Each questionnaire should take approximately 25 minutes of your time. The questionnaire will be designed as follows:

1. The first questionnaire, which is enclosed, asks you to rate and revise the competencies listed and to add to the list those competencies which you believe were omitted.
2. From the second questionnaire, you will receive a feedback of the responses given by you and other contributors. Based upon your opinion and your knowledge, you will again be asked to rate these competencies.
3. The third questionnaire will indicate your responses in relation to the consensus of the group and you will again be asked to give your ratings. If you choose to remain outside the consensus of the group, you will be asked to state your reasons briefly.

-2-

Because the same set of participants are used throughout the study, you will need to sign your name. Your name, however, will not be used in the study unless your permission is sought and granted. The need for research-based information in the data processing area is critical. As an expert in the data processing area, your contributions to this study will be very valuable.

Sincerely,

Nora Jo Martin Sherman

njs

Attachments

# QUESTIONNAIRE I

## COMPETENCIES NEEDED BY THE TEACHER OF INTRODUCTORY DATA PROCESSING

Nora Jo Martin Sherman  
University of Houston

Please return by

INTRODUCTORY DATA PROCESSING is defined as a survey course  
overviewing manual data processing, unit-record data processing,  
and a brief introduction to electronic data processing. The time  
span covered can vary and equipment may or may not be used.

DIRECTIONS: Within each of the 5 columns at the right, please  
react to each objective in terms of:

- C = Crucial
- H = Highly desirable
- D = Desirable but not absolutely necessary
- N = Nonimportant
- I = Incorrectly stated; needs revision
- X = Do not use; concept inappropriate

THE TEACHER OF INTRODUCTORY DATA PROCESSING  
SHOULD UNDERSTAND, DEMONSTRATE, AND EFFECT  
THE FOLLOWING:

### Planning

- |                                                                                                    |             |
|----------------------------------------------------------------------------------------------------|-------------|
| 1. Relationship of the data processing<br>course to other courses and the total<br>school program. | C H D N I X |
| 2. Preparation and use of a syllabus<br>for the data processing course.                            | C H D N I X |
| 3. The concepts of data processing<br>to be learned by the students.                               | C H D N I X |

- |                                                                                                                                                                                     |             |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|
| 4. Development and utilization of pre-assessment techniques which lead to pupil placement, formal and informal testing, personal interviews and observations, previous grades, etc. | C H D N I X |
| 5. Preparation of an adequate lesson plan.                                                                                                                                          | C H D N I X |
| 6. The development of instructional strategies appropriate to stated objectives and students' learning styles.                                                                      | C H D N I X |
| 7. Knowledge of the end results-- what the student is expected to accomplish by the completion of the course.                                                                       | C H D N I X |
| 8. Development and use of behavioral objectives.                                                                                                                                    | C H D N I X |
| 9. Selection of course textbooks.                                                                                                                                                   | C H D N I X |
| 10. Establishment of grading standards.                                                                                                                                             | C H D N I X |
| 11. Selection of supplementary materials.                                                                                                                                           | C H D N I X |
| 12. Collaboration with other data processing teachers, business education teachers, and administrators in planning.                                                                 | C H D N I X |
| 13. Planning course outline using long-range objectives.                                                                                                                            | C H D N I X |
| 14. Ability to plan a field trip.                                                                                                                                                   | C H D N I X |

## Other suggested Planning Competencies

|                                                |             |
|------------------------------------------------|-------------|
| _____                                          | C H D N I X |
| _____                                          | C H D N I X |
| _____                                          | C H D N I X |
| (Please use the back for additional comments.) |             |

THE TEACHER OF INTRODUCTORY DATA PROCESSING  
SHOULD UNDERSTAND, DEMONSTRATE, AND EFFECT  
THE FOLLOWING:

Administration

- |                                                                                                               |             |
|---------------------------------------------------------------------------------------------------------------|-------------|
| 1. The ability to conduct conferences with parents, teachers, and students.                                   | C H D N I X |
| 2. Arrangement of physical environment.                                                                       | C H D N I X |
| 3. Organization of teaching equipment, materials, etc.                                                        | C H D N I X |
| 4. Establishment and maintenance of classroom procedures and routines.                                        | C H D N I X |
| 5. Maintenance, storage, and retrieval of records.                                                            | C H D N I X |
| 6. Recording of grades in an efficient manner.                                                                | C H D N I X |
| 7. Establishment of smooth classroom routines, including tardiness and absences, paper collection and return. | C H D N I X |
| 8. Establishment of rapport with community organizations to facilitate field trips.                           | C H D N I X |

- |                                                        |             |
|--------------------------------------------------------|-------------|
| 9. Procedures for repair and maintenance of equipment. | C H D N I X |
|--------------------------------------------------------|-------------|

Other suggested Administrative Competencies

|  |             |
|--|-------------|
|  | C H D N I X |
|  | C H D N I X |
|  | C H D N I X |

THE TEACHER OF INTRODUCTORY DATA PROCESSING SHOULD UNDERSTAND, DEMONSTRATE, AND EFFECT THE FOLLOWING:

Instruction

Content

- |                                                            |             |
|------------------------------------------------------------|-------------|
| 1. Knowledge and application of data processing functions. | C H D N I X |
| 2. Knowledge of development of data processing tools.      | C H D N I X |
| 3. Knowledge of manual data processing.                    | C H D N I X |
| 4. Knowledge of automated data processing.                 | C H D N I X |

Unit-Record

- |                                            |             |
|--------------------------------------------|-------------|
| 5. Knowledge of use of punched cards.      | C H D N I X |
| 6. Knowledge of card planning and layout.  | C H D N I X |
| 7. Ability to record information in cards. | C H D N I X |

|                                                                          |             |
|--------------------------------------------------------------------------|-------------|
| 8. Ability to sort and classify data in cards.                           | C H D N I X |
| 9. Knowledge of process of printing, calculating, and preparing reports. | C H D N I X |
| 10. Knowledge of the control panel.                                      | C H D N I X |
| Other suggested Unit-Record Competencies                                 |             |
| _____                                                                    | C H D N I X |
| _____                                                                    | C H D N I X |
| <u>Electronic Data Processing</u>                                        |             |
| 12. Knowledge of the electronic computer.                                | C H D N I X |
| 13. Knowledge about internal storage of information.                     | C H D N I X |
| 14. Knowledge of key tape as an input device.                            | C H D N I X |
| 15. Knowledge of machine languages:                                      |             |
| 15.1 Cobol                                                               | C H D N I X |
| 15.2 Fortran                                                             | C H D N I X |
| 15.3 Basic                                                               | C H D N I X |
| 15.4 Other languages (please list):                                      |             |
| _____                                                                    | C H D N I X |
| _____                                                                    | C H D N I X |
| _____                                                                    | C H D N I X |
| 16. Understanding of human language programs and block diagrams.         | C H D N I X |

17. Knowledge of input/output systems. C H D N I X

18. Ability to flow chart. C H D N I X

Other suggested Electronic Data Processing  
Competencies

---

C H D N I X

---

C H D N I X

THE TEACHER OF INTRODUCTORY DATA PROCESSING  
SHOULD UNDERSTAND DEMONSTRATE, AND EFFECT  
THE FOLLOWING:

Instruction

Methodologies/Techniques

1. Application of psychological principles  
of learning regarding:

1.1 Favorable environment C H D N I X

1.2 Motivation C H D N I X

1.3 Practice C H D N I X

1.4 Relaxation C H D N I X

1.5 Whole vs. part learning C H D N I X

1.6 Transfer of learning C H D N I X

2. Ability to demonstrate:

2.1 Verifier C H D N I X

2.2 Sorter C H D N I X

2.3 Collator C H D N I X

2.4 Key punch C H D N I X

|     |                                                                                                    |             |
|-----|----------------------------------------------------------------------------------------------------|-------------|
| 2.5 | Reproducer                                                                                         | C H D N I X |
| 2.6 | Interpreter                                                                                        | C H D N I X |
| 2.7 | Accounting machine                                                                                 | C H D N I X |
| 3.  | Ability to demonstrate the computer.                                                               | C H D N I X |
| 4.  | Ability to enrich classroom presentation with cards, tapes, etc. used in actual business practice. | C H D N I X |
| 5.  | Ability to teach machine languages:                                                                |             |
| 5.1 | Cobal                                                                                              | C H D N I X |
| 5.2 | Fortran                                                                                            | C H D N I X |
| 5.3 | Basic                                                                                              | C H D N I X |
| 5.4 | Other languages (please list):                                                                     |             |
|     | _____                                                                                              | C H D N I X |
|     | _____                                                                                              | C H D N I X |
|     | _____                                                                                              | C H D N I X |
| 6.  | Ability to demonstrate various input/output media.                                                 | C H D N I X |
| 7.  | Ability to present an application of data processing to systems design.                            | C H D N I X |
| 8.  | Ability to demonstrate flow charting.                                                              | C H D N I X |
| 9.  | Ability to demonstrate card planning and card layout.                                              | C H D N I X |
| 10. | Ability to transfer unit-record concepts to computer concepts.                                     | C H D N I X |

11. Ability to relate personal business experience in data processing to classroom activities.

C H D N I X

Other suggested Instructional Competencies

---

C H D N I X

---

C H D N I X

THE TEACHER OF INTRODUCTORY DATA PROCESSING SHOULD UNDERSTAND, DEMONSTRATE, AND EFFECT THE FOLLOWING:

Communication

1. Effective speaking skills.
2. Proper questioning techniques.
3. Familiarity with several media for use in teaching data processing and knowledge of relative value of each.

C H D N I X

C H D N I X

- 3.1 Chalkboard

C H D N I X

- 3.2 Overhead projector

C H D N I X

- 3.3 Teaching machines,  
programmed instruction

C H D N I X

- 3.4 Videotape recorder

C H D N I X

- 3.5 Tape and/or cassette  
recorder

C H D N I X

- 3.6 Motion picture projector

C H D N I X

- 3.7 Filmstrip projector

C H D N I X

|                                            |                                                                             |             |
|--------------------------------------------|-----------------------------------------------------------------------------|-------------|
| 3.8                                        | Auto-Vance Projector<br>(Filmstrip and cassette tape<br>recorder combined). | C H D N I X |
| 3.9                                        | Bulletin board                                                              | C H D N I X |
| 4.                                         | Provision for teacher-pupil<br>interaction.                                 | C H D N I X |
| 5.                                         | Use of feedback from interaction<br>for improved teaching.                  | C H D N I X |
| 6.                                         | Understanding the importance of<br>nonverbal communication.                 | C H D N I X |
| Other suggested Communication Competencies |                                                                             |             |
| <hr/>                                      |                                                                             | C H D N I X |
| <hr/>                                      |                                                                             | C H D N I X |

THE TEACHER OF INTRODUCTORY DATA PROCESSING  
SHOULD UNDERSTAND, DEMONSTRATE, AND EFFECT  
THE FOLLOWING:

Evaluation

|    |                                                                                                 |             |
|----|-------------------------------------------------------------------------------------------------|-------------|
| 1. | Selection of valid and reliable<br>measurement techniques.                                      | C H D N I X |
| 2. | Use of pretest and posttest when<br>applicable.                                                 | C H D N I X |
| 3. | Self-evaluation of teacher techniques<br>and methods for self-improvement<br>purposes.          | C H D N I X |
| 4. | Student evaluation of teacher<br>techniques and methods for<br>purposes of teacher improvement. | C H D N I X |
| 5. | Use of student self-evaluation of<br>his learning whenever feasible.                            | C H D N I X |

6. Ability to diagnose student difficulties and apply appropriate remedial techniques.

C H D N I X

Other suggested Evaluation Competencies

---

C H D N I X

---

C H D N I X

---

C H D N I X

THE TEACHER OF INTRODUCTORY DATA PROCESSING  
SHOULD UNDERSTAND, DEMONSTRATE, AND EFFECT  
THE FOLLOWING:

Developing Pupil-Self

1. Assisting student in accepting responsibility of reaching his goals. (e.g. correct homework procedures, practice, etc.)

C H D N I X

2. Development of ability in student to accept constructive criticism.

C H D N I X

3. Development of ability in student to work under pressure.

C H D N I X

4. Development in student of a respect for time, property, and rights of others.

C H D N I X

5. Development of self-confidence in student's own ability.

C H D N I X

6. Guidance regarding data processing as a vocational possibility, or work with counselor to provide services.

C H D N I X

7. Encouragement of student to work in a part-time office position.

C H D N I X

- |                                                                            |             |
|----------------------------------------------------------------------------|-------------|
| 8. Development of ability to work independently through good study habits. | C H D N I X |
| 9. Development of ability in student to persevere.                         | C H D N I X |
| 10. Development of ability to follow instructions.                         | C H D N I X |
| 11. Development of ability to use reference materials.                     | C H D N I X |
| 12. Stressing the need for regular attendance in the classroom.            | C H D N I X |

Other suggested Competencies for Developing Student Self

- |       |             |
|-------|-------------|
| _____ | C H D N I X |
| _____ | C H D N I X |
| _____ | C H D N I X |

THE TEACHER OF INTRODUCTORY DATA PROCESSING SHOULD UNDERSTAND, DEMONSTRATE, AND EFFECT THE FOLLOWING:

Personal Attributes

- |                                                                             |             |
|-----------------------------------------------------------------------------|-------------|
| 1. Knowledge of the ethical procedures of a professional.                   | C H D N I X |
| 2. Establishment of rapport that reflects a positive influence upon pupils. | C H D N I X |
| 3. Counseling of students concerning their individual problems.             | C H D N I X |
| 4. Sensitivity to students' learning problems.                              | C H D N I X |

- |                                                                                 |             |
|---------------------------------------------------------------------------------|-------------|
| 5. Establishment of rapport with administrative and supervisory personnel.      | C H D N I X |
| 6. Development of students' confidence by never violating their trust.          | C H D N I X |
| 7. Establishment of an example to the students by his actions.                  | C H D N I X |
| 8. Establishment of a positive attitude toward the teaching of data processing. | C H D N I X |

Other suggested Personal Attributes

|  |             |
|--|-------------|
|  | C H D N I X |
|  | C H D N I X |

NAME \_\_\_\_\_

ADDRESS \_\_\_\_\_

\_\_\_\_\_

## APPENDIX G

### Background Information Questionnaire

#### for Teachers

## BACKGROUND INFORMATION

Degrees held

Name

B. A. or B. S.

Year

M. A. or M. S.

Year

Ed. D. or Ph. D.

Year

Type of certification

Areas in which certification is held

Years of teaching experience

Years of teaching experience in Data Processing

Years of work experience in business

Years of work experience in Data Processing

Grade level taught

Is Unit-Record Equipment used in your school?

Is Electronic Data Processing Equipment used?

Is Time Sharing used?

How many Data Processing courses are offered  
in your school?Please list titles of Data Processing courses offered  
by you school.Please list the titles of Data Processing courses  
you have taken.

## APPENDIX H

### Follow-up Letter for Questionnaire I

Mrs. Nora Jo Sherman

Houston, Texas 77040

November 12, 1974

Re: Study to establish competencies needed to teach data processing

Dear

If you have not returned the first questionnaire, please complete and return the attached copy to me at your earliest convenience.

The second questionnaire cannot be mailed to you until I hear from you. May I have the questionnaire soon.

Sincerely,

Mrs. Nora Jo Sherman

njs

Enclosures

## APPENDIX I

### Cover Letter and Questionnaire II

Houston, Texas 77040

November 27, 1975

Dear Respondent:

Enclosed is Questionnaire II of my study establishing competencies needed to effectively teach an introductory course in data processing at the high school or junior college level.

Your help in refining and revising the questionnaire is appreciated. The suggested revisions were all beneficial. Your suggestions may not appear on the revised questionnaire exactly as you wrote them since related ideas were combined.

Due to the Christmas mailing problem, you are asked to respond to this instrument by December 6, 1974. The results of this questionnaire will be returned to you approximately one week following the deadline data and will be used to determine a consensus.

I am looking forward to receiving your completed questionnaire.

Sincerely,

Mrs. Nora Jo Sherman

njs

Enclosure

## QUESTIONNAIRE II

### COMPETENCES NEEDED BY THE TEACHER OF INTRODUCTORY DATA PROCESSING

Nora Jo Martin Sherman  
University of Houston

Please return by  
December 6, 1974

INTRODUCTORY DATA PROCESSING is defined as a survey course  
overviewing manual data processing, unit-record data processing,  
and electronic data processing. The time span covered can vary  
and equipment may or may not be used.

**DIRECTIONS:** Within each of the 5 columns at the right, please  
react to each objective in terms of:

C = Crucial  
H = Highly desirable  
D = Desirable but not absolutely necessary  
N = Nonimportant  
I = Incorrectly stated; needs revision  
X = Do not use; concept inappropriate

The coding is repeated twice for each item. The  
first coding is for responses of secondary teachers  
and the second coding is for responses of junior  
college teachers. Authorities, please answer both.

THE TEACHER OF INTRODUCTORY DATA PROCESSING  
SHOULD UNDERSTAND, DEMONSTRATE, AND EFFECT  
THE FOLLOWING:

#### Planning

- |                                                                                                    |                                    |
|----------------------------------------------------------------------------------------------------|------------------------------------|
| 1. Relationship of the data processing<br>course to other courses and the total<br>school program. | C H D N I X (S)<br>C H D N I X (J) |
| # 2. Relationship of the data processing<br>course to positions in industry and<br>business.       | C H D N I X (S)<br>C H D N I X (J) |
| # Competencies added by respondents.                                                               |                                    |

|       |                                                                                                                                                                 |                 |
|-------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|
| # 3.  | Relationship of the data processing course to the consumer and society.                                                                                         | C H D N I X (S) |
|       |                                                                                                                                                                 | C H D N I X (J) |
| # 4.  | Preparation of a syllabus for the teacher's use.                                                                                                                | C H D N I X (S) |
|       |                                                                                                                                                                 | C H D N I X (J) |
| # 5.  | Preparation of supplementary instructional materials.                                                                                                           | C H D N I X (S) |
|       |                                                                                                                                                                 | C H D N I X (J) |
| # 6.  | Preparation of a syllabus for the data processing course.                                                                                                       | C H D N I X (S) |
|       |                                                                                                                                                                 | C H D N I X (J) |
| 7.    | Use of a syllabus for the data processing course.                                                                                                               | C H D N I X (S) |
|       |                                                                                                                                                                 | C H D N I X (J) |
| # 8.  | Development of data processing concepts to be learned by the students.                                                                                          | C H D N I X (S) |
|       |                                                                                                                                                                 | C H D N I X (J) |
| 9.    | Development of preassessment techniques which lead to pupil placement, formal and informal testing, personal interviews and observations, previous grades, etc. | C H D N I X (S) |
|       |                                                                                                                                                                 | C H D N I X (J) |
| # 10. | Utilization of preassessment techniques which lead to pupil placement, formal and informal testing, personal interviews and observations, previous grades, etc. | C H D N I X (S) |
|       |                                                                                                                                                                 | C H D N I X (J) |
| 11.   | Preparation of an adequate lesson plan.                                                                                                                         | C H D N I X (S) |
|       |                                                                                                                                                                 | C H D N I X (J) |
| 12.   | Development of instructional strategies appropriate to students' stated objectives and students' learning styles.                                               | C H D N I X (S) |
|       |                                                                                                                                                                 | C H D N I X (J) |
| # 13. | Recognition of the need for strategies appropriate to students' stated objectives and students' learning styles.                                                | C H D N I X (S) |
|       |                                                                                                                                                                 | C H D N I X (J) |

|       |                                                                                                                    |                 |
|-------|--------------------------------------------------------------------------------------------------------------------|-----------------|
| # 14. | Provision for making available the teaching materials from various manufacturers and data processing associations. | C H D N I X (S) |
|       |                                                                                                                    | C H D N I X (J) |
| # 15. | Provision for various teaching methods using creativity and imagination.                                           | C H D N I X (S) |
|       |                                                                                                                    | C H D N I X (J) |
| 16.   | Knowledge of the end results-- what the student is expected to accomplish by the completion of the course.         | C H D N I X (S) |
|       |                                                                                                                    | C H D N I X (J) |
| 17.   | Development of behavioral objectives.                                                                              | C H D N I X (S) |
|       |                                                                                                                    | C H D N I X (J) |
| # 18. | Use of behavioral objectives.                                                                                      | C H D N I X (S) |
|       |                                                                                                                    | C H D N I X (J) |
| 19.   | Selection of required course textbooks or materials.                                                               | C H D N I X (S) |
|       |                                                                                                                    | C H D N I X (J) |
| # 20. | Selection of appropriate library reference materials.                                                              | C H D N I X (S) |
|       |                                                                                                                    | C H D N I X (J) |
| 21.   | Selection of supplementary materials.                                                                              | C H D N I X (S) |
|       |                                                                                                                    | C H D N I X (J) |
| 22.   | Establishment of grading standards.                                                                                | C H D N I X (S) |
|       |                                                                                                                    | C H D N I X (J) |
| # 23. | Establishment of grading standards based on students' competencies and established objectives.                     | C H D N I X (S) |
|       |                                                                                                                    | C H D N I X (J) |
| # 24. | Collaboration with students in planning.                                                                           | C H D N I X (S) |
|       |                                                                                                                    | C H D N I X (J) |
| # 25. | Collaboration with businesses employing students for updating course content.                                      | C H D N I X (S) |
|       |                                                                                                                    | C H D N I X (J) |

- |                                                                                                                     |                                    |
|---------------------------------------------------------------------------------------------------------------------|------------------------------------|
| 26. Collaboration with other data processing teachers, business education teachers, and administrators in planning. | C H D N I X (S)<br>C H D N I X (J) |
| 27. Planning course outline using long-range objectives.                                                            | C H D N I X (S)<br>C H D N I X (J) |
| #28. Knowledge of content resulting from practical business experience in positions involving data processing.      | C H D N I X (S)<br>C H D N I X (J) |
| #29. Preparation of an individualized, self-paced course of study.                                                  | C H D N I X (S)<br>C H D N I X (J) |
| # 30. Knowledge of advanced data processing systems for teaching more effectively.                                  | C H D N I X (S)<br>C H D N I X (J) |
| # 31. Provision for exercises using data processing equipment.                                                      | C H D N I X (S)<br>C H D N I X (J) |
| # 32. Provision for "hands-on" experience, if equipment is available.                                               | C H D N I X (S)<br>C H D N I X (J) |
| # 33. Provision for speakers from businesses.                                                                       | C H D N I X (S)<br>C H D N I X (J) |
| # 34. Provision for exercises using computer program assignments.                                                   | C H D N I X (S)<br>C H D N I X (J) |
| 35. Ability to plan a field trip.                                                                                   | C H D N I X (S)<br>C H D N I X (J) |
| # 36. Ability to recommend selection of equipment.                                                                  | C H D N I X (S)<br>C H D N I X (J) |
| 37. Concepts of data processing to be learned by the students.                                                      | C H D N I X (S)<br>C H D N I X (J) |

THE TEACHER OF INTRODUCTORY DATA PROCESSING  
SHOULD UNDERSTAND, DEMONSTRATE, AND EFFECT  
THE FOLLOWING:

Administration

- |                                                                                                                        |                                    |
|------------------------------------------------------------------------------------------------------------------------|------------------------------------|
| 1. The ability to conduct conferences<br>with parents, teachers, and students.                                         | C H D N I X (S)<br>C H D N I X (J) |
| 2. Arrangement of physical equipment<br>conducive to a learning environment.                                           | C H D N I X (S)<br>C H D N I X (J) |
| 3. Organization of teaching equipment,<br>materials, etc.                                                              | C H D N I X (S)<br>C H D N I X (J) |
| 4. Establishment and maintenance of<br>classroom procedures and routines.                                              | C H D N I X (S)<br>C H D N I X (J) |
| 5. Maintenance, storage, and retrieval<br>of student records.                                                          | C H D N I X (S)<br>C H D N I X (J) |
| 6. Recording of grades in an efficient<br>manner.                                                                      | C H D N I X (S)<br>C H D N I X (J) |
| 7. Establishment of smooth classroom<br>routines, including tardiness and<br>absences, paper collection and<br>return. | C H D N I X (S)<br>C H D N I X (J) |
| 8. Establishment of rapport with<br>community organization to facilitate<br>field trips.                               | C H D N I X (S)<br>C H D N I X (J) |
| 9. Provision for repair and mainte-<br>nance of equipment, if needed.                                                  | C H D N I X (S)<br>C H D N I X (J) |

THE TEACHER OF INTRODUCTORY DATA PROCESSING  
SHOULD UNDERSTAND, DEMONSTRATE, AND EFFECT  
THE FOLLOWING:

Instruction

## Content

|       |                                                                       |                 |                 |
|-------|-----------------------------------------------------------------------|-----------------|-----------------|
| 1.    | Knowledge of data processing history.                                 | C H D N I X (S) | C H D N I X (J) |
| 2.    | Knowledge of data processing terminology.                             | C H D N I X (S) | C H D N I X (J) |
| 3.    | Knowledge and application of data processing functions.               | C H D N I X (S) | C H D N I X (J) |
| # 4.  | Development of problem-solving ability.                               | C H D N I X (S) | C H D N I X (J) |
| 5.    | Knowledge and function of automated data processing.                  | C H D N I X (S) | C H D N I X (J) |
| 6.    | Knowledge and function of manual data processing.                     | C H D N I X (S) | C H D N I X (J) |
| 7.    | Knowledge of use of punched cards.                                    | C H D N I X (S) | C H D N I X (J) |
| # 8.  | Knowledge of record planning and layout for various mediums.          | C H D N I X (S) | C H D N I X (J) |
| 9.    | Ability to keypunch information in cards.                             | C H D N I X (S) | C H D N I X (J) |
| # 10. | Ability to construct codes.                                           | C H D N I X (S) | C H D N I X (J) |
| 11.   | Ability to sort and classify data in cards by machine.                | C H D N I X (S) | C H D N I X (J) |
| 12.   | Knowledge of process of printing, calculating, and preparing reports. | C H D N I X (S) | C H D N I X (J) |
| 13.   | Knowledge of the unit-record control panel.                           | C H D N I X (S) | C H D N I X (J) |

|                                                                                                                                    |                                    |
|------------------------------------------------------------------------------------------------------------------------------------|------------------------------------|
| # 14. Knowledge of optical scanners.                                                                                               | C H D N I X (S)<br>C H D N I X (J) |
| # 15. Knowledge of data-base concepts.                                                                                             | C H D N I X (S)<br>C H D N I X (J) |
| 16. Knowledge of the electronic computer.                                                                                          | C H D N I X (S)<br>C H D N I X (J) |
| # 17. Knowledge of the minicomputer.                                                                                               | C H D N I X (S)<br>C H D N I X (J) |
| 18. Knowledge about information storage and retrieval.                                                                             | C H D N I X (S)<br>C H D N I X (J) |
| # 19. Knowledge of teleprocessing concepts.                                                                                        | C H D N I X (S)<br>C H D N I X (J) |
| # 20. Knowledge of multiprogram concepts.                                                                                          | C H D N I X (S)<br>C H D N I X (J) |
| # 21. Knowledge of documentation standards.                                                                                        | C H D N I X (S)<br>C H D N I X (J) |
| # 22. Ability to use decision tables.                                                                                              | C H D N I X (S)<br>C H D N I X (J) |
| # 23. Knowledge of interaction of systems and systems analysis.                                                                    | C H D N I X (S)<br>C H D N I X (J) |
| # 24. Knowledge of recent changes to memory and programming systems such as vertical memory concept and monolithic memory storage. | C H D N I X (S)<br>C H D N I X (J) |
| # 25. Knowledge of JCL.                                                                                                            | C H D N I X (S)<br>C H D N I X (J) |
| # 26. Knowledge of management information systems.                                                                                 | C H D N I X (S)<br>C H D N I X (J) |
| # 27. Knowledge of algorithmic design.                                                                                             | C H D N I X (S)<br>C H D N I X (J) |

|   |       |                                                                  |   |   |   |   |   |   |     |
|---|-------|------------------------------------------------------------------|---|---|---|---|---|---|-----|
| # | 28.   | Knowledge of computer execution of a program.                    | C | H | D | N | I | X | (S) |
|   |       |                                                                  | C | H | D | N | I | X | (J) |
|   | 29.   | Knowledge of key tape as an input device.                        | C | H | D | N | I | X | (S) |
|   |       |                                                                  | C | H | D | N | I | X | (J) |
|   | 30.   | Knowledge of computer language hierarchy.                        | C | H | D | N | I | X | (S) |
|   |       |                                                                  | C | H | D | N | I | X | (J) |
|   | 31.   | Knowledge of computer languages and relative importance of each: |   |   |   |   |   |   |     |
|   | 31.1  | COBOL                                                            | C | H | D | N | I | X | (S) |
|   |       |                                                                  | C | H | D | N | I | X | (J) |
|   | 31.2  | Fortran                                                          | C | H | D | N | I | X | (S) |
|   |       |                                                                  | C | H | D | N | I | X | (J) |
|   | 31.3  | Basic                                                            | C | H | D | N | I | X | (S) |
|   |       |                                                                  | C | H | D | N | I | X | (J) |
| # | 31.4  | BAL                                                              | C | H | D | N | I | X | (S) |
|   |       |                                                                  | C | H | D | N | I | X | (J) |
| # | 31.5  | Assembler                                                        | C | H | D | N | I | X | (S) |
|   |       |                                                                  | C | H | D | N | I | X | (J) |
| # | 31.6  | PL/I                                                             | C | H | D | N | I | X | (S) |
|   |       |                                                                  | C | H | D | N | I | X | (J) |
| # | 31.7  | RPG                                                              | C | H | D | N | I | X | (S) |
|   |       |                                                                  | C | H | D | N | I | X | (J) |
| # | 31.8  | RPG II                                                           | C | H | D | N | I | X | (S) |
|   |       |                                                                  | C | H | D | N | I | X | (J) |
| # | 31.9  | Prime language of systems                                        | C | H | D | N | I | X | (S) |
|   |       |                                                                  | C | H | D | N | I | X | (J) |
| # | 31.10 | GPSS                                                             | C | H | D | N | I | X | (S) |
|   |       |                                                                  | C | H | D | N | I | X | (J) |
| # | 31.11 | PERT/CPM                                                         | C | H | D | N | I | X | (S) |
|   |       |                                                                  | C | H | D | N | I | X | (J) |

|   |       |                                                 |   |   |   |   |   |   |     |
|---|-------|-------------------------------------------------|---|---|---|---|---|---|-----|
| # | 31.12 | ALGOL                                           | C | H | D | N | I | X | (S) |
|   |       |                                                 | C | H | D | N | I | X | (J) |
| # | 31.13 | Machine language                                | C | H | D | N | I | X | (S) |
|   |       |                                                 | C | H | D | N | I | X | (J) |
|   | 32.   | Knowledge of <u>only</u> one computer language. | C | H | D | N | I | X | (S) |
|   |       |                                                 | C | H | D | N | I | X | (J) |
|   | 33.   | Knowledge of input/output media.                | C | H | D | N | I | X | (S) |
|   |       |                                                 | C | H | D | N | I | X | (J) |
| # | 34.   | Knowledge of report design.                     | C | H | D | N | I | X | (S) |
|   |       |                                                 | C | H | D | N | I | X | (J) |
|   | 35.   | Ability to flow chart.                          | C | H | D | N | I | X | (S) |
|   |       |                                                 | C | H | D | N | I | X | (J) |
| # | 36.   | Knowledge of computer statistical packages.     | C | H | D | N | I | X | (S) |
|   |       |                                                 | C | H | D | N | I | X | (J) |
| # | 37.   | Knowledge of computer simulator techniques.     | C | H | D | N | I | X | (S) |
|   |       |                                                 | C | H | D | N | I | X | (J) |

#### Methodologies / Techniques

##### 1. Application of psychological principles of learning regarding:

|     |                         |   |   |   |   |   |   |     |
|-----|-------------------------|---|---|---|---|---|---|-----|
| 1.1 | Favorable environment   | C | H | D | N | I | X | (S) |
|     |                         | C | H | D | N | I | X | (J) |
| 1.2 | Motivation              | C | H | D | N | I | X | (S) |
|     |                         | C | H | D | N | I | X | (J) |
| 1.3 | Practice                | C | H | D | N | I | X | (S) |
|     |                         | C | H | D | N | I | X | (J) |
| 1.4 | Relaxation              | C | H | D | N | I | X | (S) |
|     |                         | C | H | D | N | I | X | (J) |
| 1.5 | Whole vs. part learning | C | H | D | N | I | X | (S) |
|     |                         | C | H | D | N | I | X | (J) |

|       |                                                                                                    |                 |
|-------|----------------------------------------------------------------------------------------------------|-----------------|
| 1.6   | Transfer of learning                                                                               | C H D N I X (S) |
|       |                                                                                                    | C H D N I X (J) |
| 2.    | Ability to demonstrate:                                                                            |                 |
| 2.1   | Verifier                                                                                           | C H D N I X (S) |
|       |                                                                                                    | C H D N I X (J) |
| 2.2   | Sorter                                                                                             | C H D N I X (S) |
|       |                                                                                                    | C H D N I X (J) |
| 2.3   | Collator                                                                                           | C H D N I X (S) |
|       |                                                                                                    | C H D N I X (J) |
| 2.4   | Keypunch                                                                                           | C H D N I X (S) |
|       |                                                                                                    | C H D N I X (J) |
| 2.5   | Reproducer                                                                                         | C H D N I X (S) |
|       |                                                                                                    | C H D N I X (J) |
| 2.6   | Interpreter                                                                                        | C H D N I X (S) |
|       |                                                                                                    | C H D N I X (J) |
| 2.7   | Accounting machine                                                                                 | C H D N I X (S) |
|       |                                                                                                    | C H D N I X (J) |
| # 2.8 | Report design                                                                                      | C H D N I X (S) |
|       |                                                                                                    | C H D N I X (J) |
| 2.9   | Computer                                                                                           | C H D N I X (S) |
|       |                                                                                                    | C H D N I X (J) |
| 3.    | Ability to enrich classroom presentation with cards, tapes, etc. used in actual business practice. | C H D N I X (S) |
|       |                                                                                                    | C H D N I X (J) |
| 4.    | Ability to teach computer (programming) languages:                                                 |                 |
| 4.1   | COBOL                                                                                              | C H D N I X (S) |
|       |                                                                                                    | C H D N I X (J) |
| 4.2   | Fortran                                                                                            | C H D N I X (S) |
|       |                                                                                                    | C H D N I X (J) |

|    |                                                                    |                           |                 |
|----|--------------------------------------------------------------------|---------------------------|-----------------|
|    | 4.3                                                                | Basic                     | C H D N I X (S) |
|    |                                                                    |                           | C H D N I X (J) |
| #  | 4.4                                                                | BAL                       | C H D N I X (S) |
|    |                                                                    |                           | C H D N I X (J) |
| #  | 4.5                                                                | Assembler                 | C H D N I X (S) |
|    |                                                                    |                           | C H D N I X (J) |
| #  | 4.6                                                                | PL/I                      | C H D N I X (S) |
|    |                                                                    |                           | C H D N I X (J) |
| #  | 4.7                                                                | RPG                       | C H D N I X (S) |
|    |                                                                    |                           | C H D N I X (J) |
| #  | 4.8                                                                | RPG II                    | C H D N I X (S) |
|    |                                                                    |                           | C H D N I X (J) |
| #  | 4.9                                                                | Prime language of systems | C H D N I X (S) |
|    |                                                                    |                           | C H D N I X (J) |
| #  | 4.10                                                               | GPSS                      | C H D N I X (S) |
|    |                                                                    |                           | C H D N I X (J) |
| #  | 4.11                                                               | PERT /CPM                 | C H D N I X (S) |
|    |                                                                    |                           | C H D N I X (J) |
| #  | 4.12                                                               | ALGOL                     | C H D N I X (S) |
|    |                                                                    |                           | C H D N I X (J) |
| #  | 4.13                                                               | Machine language          | C H D N I X (S) |
|    |                                                                    |                           | C H D N I X (J) |
| 5. | Ability to demonstrate various input/output media.                 |                           | C H D N I X (S) |
|    |                                                                    |                           | C H D N I X (J) |
| 6. | Ability to present systems design for data processing application. |                           | C H D N I X (S) |
|    |                                                                    |                           | C H D N I X (J) |
| 7. | Ability to demonstrate flow charting.                              |                           | C H D N I X (S) |
|    |                                                                    |                           | C H D N I X (J) |
| 8. | Ability to demonstrate input planning.                             |                           | C H D N I X (S) |
|    |                                                                    |                           | C H D N I X (J) |

- |       |                                                                                             |                 |
|-------|---------------------------------------------------------------------------------------------|-----------------|
| 9.    | Ability to transfer unit-record concepts to computer concepts.                              | C H D N I X (S) |
|       |                                                                                             | C H D N I X (J) |
| 10.   | Ability to relate personal business experience in data processing to classroom activities.  | C H D N I X (S) |
|       |                                                                                             | C H D N I X (J) |
| # 11. | Ability to teach JCL.                                                                       | C H D N I X (S) |
|       |                                                                                             | C H D N I X (J) |
| # 12. | Ability to compare manual data handling to each of the functions of computer data handling. | C H D N I X (S) |
|       |                                                                                             | C H D N I X (J) |
| # 13. | Ability to operate the classroom as a data processing office simulation.                    | C H D N I X (S) |
|       |                                                                                             | C H D N I X (J) |

THE TEACHER OF INTRODUCTORY DATA PROCESSING  
SHOULD UNDERSTAND, DEMONSTRATE, AND EFFECT  
THE FOLLOWING:

Communication

- |     |                                                                                                             |                 |
|-----|-------------------------------------------------------------------------------------------------------------|-----------------|
| 1.  | Effective speaking skills.                                                                                  | C H D N I X (S) |
|     |                                                                                                             | C H D N I X (J) |
| 2.  | Proper questioning techniques.                                                                              | C H D N I X (S) |
|     |                                                                                                             | C H D N I X (J) |
| 3.  | Familiarity with several media for use in teaching data processing and knowledge of relative value of each. |                 |
| 3.1 | Chalkboard                                                                                                  | C H D N I X (S) |
|     |                                                                                                             | C H D N I X (J) |
| 3.2 | Overhead projector                                                                                          | C H D N I X (S) |
|     |                                                                                                             | C H D N I X (J) |
| 3.3 | Teaching machines, programmed instruction                                                                   | C H D N I X (S) |
|     |                                                                                                             | C H D N I X (J) |

|      |                                                                         |   |   |   |   |   |   |     |
|------|-------------------------------------------------------------------------|---|---|---|---|---|---|-----|
| 3.4  | Videotape recorder                                                      | C | H | D | N | I | X | (S) |
|      |                                                                         | C | H | D | N | I | X | (J) |
| 3.5  | Tape and/or cassette recorder                                           | C | H | D | N | I | X | (S) |
|      |                                                                         | C | H | D | N | I | X | (J) |
| 3.6  | Motion picture projector                                                | C | H | D | N | I | X | (S) |
|      |                                                                         | C | H | D | N | I | X | (J) |
| 3.7  | Filmstrip projector                                                     | C | H | D | N | I | X | (S) |
|      |                                                                         | C | H | D | N | I | X | (J) |
| 3.8  | Auto-Vance Projector<br>(Filmstrip and cassette tape recorder combined) | C | H | D | N | I | X | (S) |
|      |                                                                         | C | H | D | N | I | X | (J) |
| 3.9  | Bulletin board                                                          | C | H | D | N | I | X | (S) |
|      |                                                                         | C | H | D | N | I | X | (J) |
| 4.   | Provision for teacher-pupil interaction.                                | C | H | D | N | I | X | (S) |
|      |                                                                         | C | H | D | N | I | X | (J) |
| 5.   | Use of feedback from interaction for improved teaching.                 | C | H | D | N | I | X | (S) |
|      |                                                                         | C | H | D | N | I | X | (J) |
| 6.   | Understanding the importance of nonverbal communication.                | C | H | D | N | I | X | (S) |
|      |                                                                         | C | H | D | N | I | X | (J) |
| # 7. | Ability to use nonverbal communication.                                 | C | H | D | N | I | X | (S) |
|      |                                                                         | C | H | D | N | I | X | (J) |
| # 8. | Ability to explain verbally.                                            | C | H | D | N | I | X | (S) |
|      |                                                                         | C | H | D | N | I | X | (J) |

THE TEACHER OF INTRODUCTORY DATA PROCESSING SHOULD UNDERSTAND, DEMONSTRATE, AND EFFECT THE FOLLOWING:

#### Evaluation

|      |                                                            |   |   |   |   |   |   |     |
|------|------------------------------------------------------------|---|---|---|---|---|---|-----|
| 1.   | Selection of valid and reliable measurement techniques.    | C | H | D | N | I | X | (S) |
|      |                                                            | C | H | D | N | I | X | (J) |
| # 2. | Construction of valid and reliable measurement techniques. | C | H | D | N | I | X | (S) |
|      |                                                            | C | H | D | N | I | X | (J) |

|      |                                                                                           |                 |                 |
|------|-------------------------------------------------------------------------------------------|-----------------|-----------------|
| 3.   | Use of pretest and posttest when applicable.                                              | C H D N I X (S) | C H D N I X (J) |
| 4.   | Self-evaluation of teacher techniques and methods for self-improvement purposes.          | C H D N I X (S) | C H D N I X (J) |
| 5.   | Student evaluation of teacher techniques and methods for purposes of teacher improvement. | C H D N I X (S) | C H D N I X (J) |
| 6.   | Use of student self-evaluation of his learning whenever feasible.                         | C H D N I X (S) | C H D N I X (J) |
| 7.   | Ability to diagnose student difficulties.                                                 | C H D N I X (S) | C H D N I X (J) |
| # 8. | Ability to apply appropriate remedial techniques.                                         | C H D N I X (S) | C H D N I X (J) |

THE TEACHER OF INTRODUCTORY DATA PROCESSING  
SHOULD UNDERSTAND, DEMONSTRATE, AND EFFECT  
THE FOLLOWING:

Developing Pupil-Self

|    |                                                                                                                          |                 |                 |
|----|--------------------------------------------------------------------------------------------------------------------------|-----------------|-----------------|
| 1. | Assisting student in accepting responsibility of reaching his goals. (e.g., correct homework procedures, practice, etc.) | C H D N I X (S) | C H D N I X (J) |
| 2. | Development of ability in student to accept constructive criticism.                                                      | C H D N I X (S) | C H D N I X (J) |
| 3. | Development of ability in student to work under pressure.                                                                | C H D N I X (S) | C H D N I X (J) |
| 4. | Development in student of a respect for time, property, and rights of others.                                            | C H D N I X (S) | C H D N I X (J) |
| 5. | Development of self-confidence in student's own ability.                                                                 | C H D N I X (S) | C H D N I X (J) |

|      |                                                                                                             |                                    |
|------|-------------------------------------------------------------------------------------------------------------|------------------------------------|
| 6.   | Guidance regarding data processing as a vocational possibility, or work with counselor to provide services. | C H D N I X (S)<br>C H D N I X (J) |
| # 7. | Guidance regarding scholarship possibilities for advanced study.                                            | C H D N I X (S)<br>C H D N I X (J) |
| # 8. | Stressing the need for high scholarship to compete for scholarships in advanced training.                   | C H D N I X (S)<br>C H D N I X (J) |
| 9.   | Encouragement of student to work in a part-time office position.                                            | C H D N I X (S)<br>C H D N I X (J) |
| 10.  | Development of ability to work independently through good study habits.                                     | C H D N I X (S)<br>C H D N I X (J) |
| 11.  | Development of ability in student to persevere.                                                             | C H D N I X (S)<br>C H D N I X (J) |
| 12.  | Development of ability to follow instructions.                                                              | C H D N I X (S)<br>C H D N I X (J) |
| 13.  | Development of ability to use reference materials.                                                          | C H D N I X (S)<br>C H D N I X (J) |
| 14.  | Stressing the need for regular attendance in the classroom.                                                 | C H D N I X (S)                    |

THE TEACHER OF INTRODUCTORY DATA PROCESSING  
SHOULD UNDERSTAND, DEMONSTRATE, AND EFFECT  
THE FOLLOWING:

Personal Attributes

|    |                                                                          |                                    |
|----|--------------------------------------------------------------------------|------------------------------------|
| 1. | Knowledge of the ethical procedures of a professional.                   | C H D N I X (S)<br>C H D N I X (J) |
| 2. | Establishment of rapport that reflects a positive influence upon pupils. | C H D N I X (S)<br>C H D N I X (J) |

- |                                                                                 |                                    |
|---------------------------------------------------------------------------------|------------------------------------|
| 3. Counseling of students concerning their individual problems.                 | C H D N I X (S)<br>C H D N I X (J) |
| 4. Sensitivity to students' learning problems.                                  | C H D N I X (S)<br>C H D N I X (J) |
| 5. Establishment of rapport with administrative and supervisory personnel.      | C H D N I X (S)<br>C H D N I X (J) |
| 6. Development of students' confidence by never violating their trust.          | C H D N I X (S)<br>C H D N I X (J) |
| # 7. Establishing a need for creativity.                                        | C H D N I X (S)<br>C H D N I X (J) |
| 8. Establishment of a positive attitude toward the teaching of data processing. | C H D N I X (S)<br>C H D N I X (J) |
| # 9. Ability to use patience with slow learners.                                | C H D N I X (S)<br>C H D N I X (J) |
| 10. Establishment of proper teacher behavior as an example to students.         | C H D N I X (S)<br>C H D N I X (J) |
| # 11. Provision for continuous learning and updating.                           | C H D N I X (S)<br>C H D N I X (J) |
| # 12. Development of total dedication to teaching.                              | C H D N I X (S)<br>C H D N I X (J) |
| # 13. Participation in in-service data processing workshops and conferences.    | C H D N I X (S)<br>C H D N I X (J) |

Your name \_\_\_\_\_

Address \_\_\_\_\_

\_\_\_\_\_

## APPENDIX J

Follow-up Letter for Questionnaire II

Houston, Texas 77040  
December 16, 1974

Dear Respondent:

Questionnaire II was mailed to you on November 27. I am attempting to mail the final questionnaire prior to Christmas. May I please have your response as soon as possible.

Several questionnaires were returned without names. If you have previously mailed your response and think yours might have had the name omitted, please let me know.

Sincerely,

(Mrs.) Nora Jo Sherman

njs

## APPENDIX K

### Cover Letter and Questionnaire III

Houston, Texas 77040

January 17, 1975

Dear Respondent:

Your prompt response to Questionnaire II during the holiday season was appreciated. A death in our extended family prevented my handling the data expeditiously.

Questionnaire III concerning competencies needed by the teacher of introductory data processing is enclosed.

The modal consensus, responses which occurred most often, has been indicated with a square (☐). Two squares (☐☐) have been used to indicate a bimodal consensus, responses with the same frequency. Your response has been encircled in red pencil (⊙). This has been done so that you can review your response in relation to the group consensus response and reassess your rating. If you choose to remain outside the modal consensus of your group, will you please give a brief reason for your choice.

Return of your responses to this final questionnaire by February 5 will be appreciated. You will be provided a synopsis of the study as soon as the final report is completed.

Thank you for your time, thought, and helpful comments during the course of this study.

Sincerely,

Mrs. Nora Jo Sherman

Enclosure

## QUESTIONNAIRE III

COMPETENCES NEEDED BY THE TEACHER OF  
INTRODUCTORY DATA PROCESSING

Nora Jo Martin Sherman  
University of Houston

Please return by  
February 5, 1975

INTRODUCTORY DATA PROCESSING is defined as a survey course  
overviewing manual data processing, unit-record data processing,  
and electronic data processing. The time span covered can vary  
and equipment may or may not be used.

**DIRECTIONS:** Within each of the 5 columns at the right, please  
react to each objective in terms of:

C = Crucial  
H = Highly desirable  
D = Desirable but not absolutely necessary  
N = Nonimportant  
I = Incorrectly stated; needs revision  
X = Do not use; concept inappropriate

The coding is repeated twice for each item. The  
first coding is for responses of secondary teachers,  
and the second coding is for responses of junior  
college teachers. Authorities, please answer both.

THE TEACHER OF INTRODUCTORY DATA PROCESSING  
SHOULD UNDERSTAND, DEMONSTRATE, AND EFFECT  
THE FOLLOWING:

Planning

- |                                                                                                    |                                                                      |
|----------------------------------------------------------------------------------------------------|----------------------------------------------------------------------|
| 1. Relationship of the data processing<br>course to other courses and the total<br>school program. | C H <input checked="" type="checkbox"/> N I X (S)<br>C H D N I X (J) |
| 2. Relationship of the data processing<br>course to positions in industry and<br>business.         | C <input checked="" type="checkbox"/> D N I X (S)<br>C H D N I X (J) |

- |                                                                                                                                                                     |                                                                                               |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------|
| 3. Relationship of the data processing course to the consumer and society.                                                                                          | C <input type="checkbox"/> H D N I X (S)<br>C H D N I X (J)                                   |
| 4. Preparation of a syllabus for the teacher's use.                                                                                                                 | C <input type="checkbox"/> H D N I X (S)<br>C H D N I X (J)                                   |
| 5. Preparation of supplementary instructional materials.                                                                                                            | C <input type="checkbox"/> H D N I X (S)<br>C H D N I X (J)                                   |
| 6. Preparation of a syllabus for the data processing course.                                                                                                        | C <input type="checkbox"/> H D N I X (S)<br>C H D N I X (J)                                   |
| 7. Use of a syllabus for the data processing course.                                                                                                                | C <input type="checkbox"/> H D N I X (S)<br>C H D N I X (J)                                   |
| 8. Development of data processing concepts to be learned by the students.                                                                                           | <input checked="" type="checkbox"/> H D N I X (S)<br>C H D N I X (J)                          |
| 9. Development of preassessment techniques which lead to pupil placement, formal and informal testing, personal interviews and observations, previous grades, etc.  | C <input type="checkbox"/> H D N I X (S)<br>C H D N I X (J)                                   |
| 10. Utilization of preassessment techniques which lead to pupil placement, formal and informal testing, personal interviews and observations, previous grades, etc. | C <input type="checkbox"/> H D N I X (S)<br>C H D N I X (J)                                   |
| 11. Preparation of an adequate lesson plan.                                                                                                                         | <input checked="" type="checkbox"/> <input type="checkbox"/> H D N I X (S)<br>C H D N I X (J) |
| 12. Development of instructional strategies appropriate to students' stated objectives and students' learning styles.                                               | <input checked="" type="checkbox"/> <input type="checkbox"/> H D N I X (S)<br>C H D N I X (J) |
| 13. Recognition of the need for strategies appropriate to students' stated objectives and students' learning styles.                                                | C <input type="checkbox"/> H D N I X (S)<br>C H D N I X (J)                                   |

- |                                                                                                                        |                                                                        |
|------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------|
| 14. Provision for making available the teaching materials from various manufacturers and data processing associations. | C <input checked="" type="checkbox"/> H D N I X (S)<br>C H D N I X (J) |
| 15. Provision for various teaching methods using creativity and imagination.                                           | C <input checked="" type="checkbox"/> H D N I X (S)<br>C H D N I X (J) |
| 16. Knowledge of the end results-- what the student is expected to accomplish by the completion of the course.         | <input checked="" type="checkbox"/> H D N I X (S)<br>C H D N I X (J)   |
| 17. Development of behavioral objectives.                                                                              | C <input checked="" type="checkbox"/> H D N I X (S)<br>C H D N I X (J) |
| 18. Use of behavioral objectives.                                                                                      | C <input checked="" type="checkbox"/> H D N I X (S)<br>C H D N I X (J) |
| 19. Selection of required course textbooks or materials.                                                               | C <input checked="" type="checkbox"/> H D N I X (S)<br>C H D N I X (J) |
| 20. Selection of appropriate library reference materials.                                                              | C <input checked="" type="checkbox"/> H D N I X (S)<br>C H D N I X (J) |
| 21. Selection of supplementary materials.                                                                              | C <input checked="" type="checkbox"/> H D N I X (S)<br>C H D N I X (J) |
| 22. Establishment of grading standards.                                                                                | C <input checked="" type="checkbox"/> H D N I X (S)<br>C H D N I X (J) |
| 23. Establishment of grading standards based on students' competencies and established objectives.                     | C <input checked="" type="checkbox"/> H D N I X (S)<br>C H D N I X (J) |
| 24. Collaboration with students in planning.                                                                           | C H <input checked="" type="checkbox"/> D N I X (S)<br>C H D N I X (J) |
| 25. Collaboration with businesses employing students for updating course content.                                      | C <input checked="" type="checkbox"/> H D N I X (S)<br>C H D N I X (J) |

- |                                                                                                                     |                                                                                                        |
|---------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------|
| 26. Collaboration with other data processing teachers, business education teachers, and administrators in planning. | C <input checked="" type="checkbox"/> D N I X (S)<br>C H D N I X (J)                                   |
| 27. Planning course outline using long-range objectives.                                                            | C <input checked="" type="checkbox"/> D N I X (S)<br>C H D N I X (J)                                   |
| 28. Knowledge of content resulting from practical business experience in positions involving data processing.       | C <input checked="" type="checkbox"/> D N I X (S)<br>C H D N I X (J)                                   |
| 29. Preparation of an individualized, self-paced course of study.                                                   | C H <input checked="" type="checkbox"/> N I X (S)<br>C H D N I X (J)                                   |
| 30. Knowledge of advanced data processing systems for teaching more effectively.                                    | C <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> N I X (S)<br>C H D N I X (J) |
| 31. Provision for exercises using data processing equipment.                                                        | C <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> N I X (S)<br>C H D N I X (J) |
| 32. Provision for "hands-on" experience, if equipment is available.                                                 | C <input checked="" type="checkbox"/> D N I X (S)<br>C H D N I X (J)                                   |
| 33. Provision for speakers from businesses.                                                                         | C H <input checked="" type="checkbox"/> N I X (S)<br>C H D N I X (J)                                   |
| 34. Provision for exercises using computer program assignments.                                                     | C <input checked="" type="checkbox"/> D N I X (S)<br>C H D N I X (J)                                   |
| 35. Ability to plan a field trip.                                                                                   | C <input checked="" type="checkbox"/> D N I X (S)<br>C H D N I X (J)                                   |
| 36. Ability to recommend selection of equipment.                                                                    | C <input checked="" type="checkbox"/> D N I X (S)<br>C H D N I X (J)                                   |
| 37. Concepts of data processing to be learned by the students.                                                      | C <input checked="" type="checkbox"/> D N I X (S)<br>C H D N I X (J)                                   |

THE TEACHER OF INTRODUCTORY DATA PROCESSING  
SHOULD UNDERSTAND, DEMONSTRATE, AND EFFECT  
THE FOLLOWING:

Administration

- |                                                                                                                        |                                                                                                            |
|------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------|
| 1. The ability to conduct conferences<br>with parents, teachers, and students.                                         | C <input checked="" type="checkbox"/> H D N I X (S)<br>C H D N I X (J)                                     |
| 2. Arrangement of physical equipment<br>conducive to a learning environment.                                           | C <input checked="" type="checkbox"/> H D N I X (S)<br>C H D N I X (J)                                     |
| 3. Organization of teaching equipment,<br>materials, etc.                                                              | C <input checked="" type="checkbox"/> H D N I X (S)<br>C H D N I X (J)                                     |
| 4. Establishment and maintenance of<br>classroom procedures and routines.                                              | C <input checked="" type="checkbox"/> H D N I X (S)<br>C H D N I X (J)                                     |
| 5. Maintenance, storage, and retrieval<br>of student records.                                                          | <input checked="" type="checkbox"/> C H D N I X (S)<br>C H D N I X (J)                                     |
| 6. Recording of grades in an efficient<br>manner.                                                                      | <input checked="" type="checkbox"/> C H D N I X (S)<br>C H D N I X (J)                                     |
| 7. Establishment of smooth classroom<br>routines, including tardiness and<br>absences, paper collection and<br>return. | C <input checked="" type="checkbox"/> H D N I X (S)<br>C H D N I X (J)                                     |
| 8. Establishment of rapport with<br>community organization to facilitate<br>field trips.                               | C <input checked="" type="checkbox"/> H D N I X (S)<br>C H D N I X (J)                                     |
| 9. Provision for repair and mainte-<br>nance of equipment if needed.                                                   | <input checked="" type="checkbox"/> C <input checked="" type="checkbox"/> H D N I X (S)<br>C H D N I X (J) |

THE TEACHER OF INTRODUCTORY DATA PROCESSING  
SHOULD UNDERSTAND, DEMONSTRATE, AND EFFECT  
THE FOLLOWING:

Instruction

## Content

|                                                                           |                                                                        |
|---------------------------------------------------------------------------|------------------------------------------------------------------------|
| 1. Knowledge of data processing history.                                  | C <input checked="" type="checkbox"/> H D N I X (S)<br>C H D N I X (J) |
| 2. Knowledge of data processing terminology.                              | <input checked="" type="checkbox"/> H D N I X (S)<br>C H D N I X (J)   |
| 3. Knowledge and application of data processing functions.                | <input checked="" type="checkbox"/> H D N I X (S)<br>C H D N I X (J)   |
| 4. Development of problem-solving ability.                                | C <input checked="" type="checkbox"/> H D N I X (S)<br>C H D N I X (J) |
| 5. Knowledge and function of automated data processing.                   | C <input checked="" type="checkbox"/> H D N I X (S)<br>C H D N I X (J) |
| 6. Knowledge and function of manual data processing.                      | C <input checked="" type="checkbox"/> H D N I X (S)<br>C H D N I X (J) |
| 7. Knowledge of use of punched cards.                                     | C <input checked="" type="checkbox"/> H D N I X (S)<br>C H D N I X (J) |
| 8. Knowledge of record planning and layout for various mediums.           | C <input checked="" type="checkbox"/> H D N I X (S)<br>C H D N I X (J) |
| 9. Ability to keypunch information in cards.                              | C <input checked="" type="checkbox"/> H D N I X (S)<br>C H D N I X (J) |
| 10. Ability to construct codes.                                           | C <input checked="" type="checkbox"/> H D N I X (S)<br>C H D N I X (J) |
| 11. Ability to sort and classify data in cards by machine.                | C <input checked="" type="checkbox"/> H D N I X (S)<br>C H D N I X (J) |
| 12. Knowledge of process of printing, calculating, and preparing reports. | C <input checked="" type="checkbox"/> H D N I X (S)<br>C H D N I X (J) |
| 13. Knowledge of the unit-record control panel.                           | C H <input checked="" type="checkbox"/> D N I X (S)<br>C H D N I X (J) |

- |                                                                                                                                  |                                                                                  |
|----------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------|
| 14. Knowledge of optical scanners.                                                                                               | C H <input type="checkbox"/> N I X (S)<br>C H D N I X (J)                        |
| 15. Knowledge of data-base concepts.                                                                                             | C H <input type="checkbox"/> N I X (S)<br>C H D N I X (J)                        |
| 16. Knowledge of the electronic computer.                                                                                        | C <input type="checkbox"/> D N I X (S)<br>C H D N I X (J)                        |
| 17. Knowledge of the minicomputer.                                                                                               | C <input type="checkbox"/> D N I X (S)<br>C H D N I X (J)                        |
| 18. Knowledge about information storage and retrieval.                                                                           | C <input type="checkbox"/> D N I X (S)<br>C H D N I X (J)                        |
| 19. Knowledge of teleprocessing concepts.                                                                                        | C <input type="checkbox"/> <input type="checkbox"/> N I X (S)<br>C H D N I X (J) |
| 20. Knowledge of multiprogram concepts.                                                                                          | C H <input type="checkbox"/> N I X (S)<br>C H D N I X (J)                        |
| 21. Knowledge of documentation standards.                                                                                        | C <input type="checkbox"/> D N I X (S)<br>C H D N I X (J)                        |
| 22. Ability to use decision tables.                                                                                              | C <input type="checkbox"/> D N I X (S)<br>C H D N I X (J)                        |
| 23. Knowledge of interaction of systems and systems analysis.                                                                    | C H <input type="checkbox"/> N I X (S)<br>C H D N I X (J)                        |
| 24. Knowledge of recent changes to memory and programming systems such as vertical memory concept and monolithic memory storage. | C H <input type="checkbox"/> N I X (S)<br>C H D N I X (J)                        |
| 25. Knowledge of JCL.                                                                                                            | C <input type="checkbox"/> <input type="checkbox"/> N I X (S)<br>C H D N I X (J) |
| 26. Knowledge of management information systems.                                                                                 | C H <input type="checkbox"/> N I X (S)<br>C H D N I X (J)                        |
| 27. Knowledge of algorithmic design.                                                                                             | C H <input type="checkbox"/> N I X (S)<br>C H D N I X (J)                        |

- |                                                                      |                                                                                                            |
|----------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------|
| 28. Knowledge of computer execution of a program.                    | C <input checked="" type="checkbox"/> D N I X (S)<br>C H D N I X (J)                                       |
| 29. Knowledge of key tape as an input device.                        | C <input checked="" type="checkbox"/> D N I X (S)<br>C H D N I X (J)                                       |
| 30. Knowledge of computer language hierarchy.                        | C <input checked="" type="checkbox"/> D N I X (S)<br>C H D N I X (J)                                       |
| 31. Knowledge of computer languages and relative importance of each: |                                                                                                            |
| 31.1 COBOL                                                           | C <input checked="" type="checkbox"/> D N I X (S)<br>C H D N I X (J)                                       |
| 31.2 Fortran                                                         | C <input checked="" type="checkbox"/> D N I X (S)<br>C H D N I X (J)                                       |
| 31.3 Basic                                                           | C <input checked="" type="checkbox"/> D N I X (S)<br>C H D N I X (J)                                       |
| 31.4 BAL                                                             | C H <input checked="" type="checkbox"/> D N I X (S)<br>C H D N I X (J)                                     |
| 31.5 Assembler                                                       | C H <input checked="" type="checkbox"/> D N I X (S)<br>C H D N I X (J)                                     |
| 31.6 PL/I                                                            | C H <input checked="" type="checkbox"/> D N I X (S)<br>C H D N I X (J)                                     |
| 31.7 RPG                                                             | C <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> D N I X (S)<br>C H D N I X (J)   |
| 31.8 RPG II                                                          | C <input checked="" type="checkbox"/> D N I X (S)<br>C H D N I X (J)                                       |
| 31.9 Prime language of systems                                       | C H <input checked="" type="checkbox"/> D N I X (S)<br>C H D N I X (J)                                     |
| 31.10 GPSS                                                           | C H <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> D N I X (S)<br>C H D N I X (J) |
| 31.11 PERT/CPM                                                       | C H D <input checked="" type="checkbox"/> N I X (S)<br>C H D N I X (J)                                     |

|       |                                                 |   |                                     |                                     |                                     |   |   |     |
|-------|-------------------------------------------------|---|-------------------------------------|-------------------------------------|-------------------------------------|---|---|-----|
| 31.12 | ALGOL                                           | C | H                                   | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | I | X | (S) |
|       |                                                 | C | H                                   | D                                   | N                                   | I | X | (J) |
| 31.13 | Machine language                                | C | H                                   | <input checked="" type="checkbox"/> | N                                   | I | X | (S) |
|       |                                                 | C | H                                   | D                                   | N                                   | I | X | (J) |
| 32.   | Knowledge of <u>only</u> one computer language. | C | H                                   | D                                   | <input checked="" type="checkbox"/> | I | X | (S) |
|       |                                                 | C | H                                   | D                                   | N                                   | I | X | (J) |
| 33.   | Knowledge of input/output media.                | C | <input checked="" type="checkbox"/> | D                                   | N                                   | I | X | (S) |
|       |                                                 | C | H                                   | D                                   | N                                   | I | X | (J) |
| 34.   | Knowledge of report design.                     | C | <input checked="" type="checkbox"/> | D                                   | N                                   | I | X | (S) |
|       |                                                 | C | H                                   | D                                   | N                                   | I | X | (J) |
| 35.   | Ability to flow chart.                          | C | <input checked="" type="checkbox"/> | D                                   | N                                   | I | X | (S) |
|       |                                                 | C | H                                   | D                                   | N                                   | I | X | (J) |
| 36.   | Knowledge of computer statistical packages.     | C | H                                   | <input checked="" type="checkbox"/> | N                                   | I | X | (S) |
|       |                                                 | C | H                                   | D                                   | N                                   | I | X | (J) |
| 37.   | Knowledge of computer simulator techniques.     | C | H                                   | <input checked="" type="checkbox"/> | N                                   | I | X | (S) |
|       |                                                 | C | H                                   | D                                   | N                                   | I | X | (J) |

### Methodologies/Techniques

#### 1. Application of psychological principles of learning regarding:

|     |                         |   |                                     |   |   |   |   |     |
|-----|-------------------------|---|-------------------------------------|---|---|---|---|-----|
| 1.1 | Favorable environment   | C | <input checked="" type="checkbox"/> | D | N | I | X | (S) |
|     |                         | C | H                                   | D | N | I | X | (J) |
| 1.2 | Motivation              | C | <input checked="" type="checkbox"/> | D | N | I | X | (S) |
|     |                         | C | H                                   | D | N | I | X | (J) |
| 1.3 | Practice                | C | <input checked="" type="checkbox"/> | D | N | I | X | (S) |
|     |                         | C | H                                   | D | N | I | X | (J) |
| 1.4 | Relaxation              | C | <input checked="" type="checkbox"/> | D | N | I | X | (S) |
|     |                         | C | H                                   | D | N | I | X | (J) |
| 1.5 | Whole vs. part learning | C | <input checked="" type="checkbox"/> | D | N | I | X | (S) |
|     |                         | C | H                                   | D | N | I | X | (J) |

|     |                                                                                                    |                                                                                                 |
|-----|----------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------|
| 1.6 | Transfer of learning                                                                               | C <input checked="" type="checkbox"/> H <input type="checkbox"/> D N I X (S)<br>C H D N I X (J) |
| 2.  | Ability to demonstrate:                                                                            |                                                                                                 |
| 2.1 | Verifier                                                                                           | C <input checked="" type="checkbox"/> H <input type="checkbox"/> D N I X (S)<br>C H D N I X (J) |
| 2.2 | Sorter                                                                                             | C <input checked="" type="checkbox"/> H <input type="checkbox"/> D N I X (S)<br>C H D N I X (J) |
| 2.3 | Collator                                                                                           | C H <input type="checkbox"/> D N I X (S)<br>C H D N I X (J)                                     |
| 2.4 | Keypunch                                                                                           | C <input checked="" type="checkbox"/> H <input type="checkbox"/> D N I X (S)<br>C H D N I X (J) |
| 2.5 | Reproducer                                                                                         | C H <input type="checkbox"/> D N I X (S)<br>C H D N I X (J)                                     |
| 2.6 | Interpreter                                                                                        | C H <input type="checkbox"/> D N I X (S)<br>C H D N I X (J)                                     |
| 2.7 | Accounting machine                                                                                 | C H <input type="checkbox"/> D N I X (S)<br>C H D N I X (J)                                     |
| 2.8 | Report design                                                                                      | C H <input type="checkbox"/> D N I X (S)<br>C H D N I X (J)                                     |
| 2.9 | Computer                                                                                           | <input checked="" type="checkbox"/> H D N I X (S)<br>C H D N I X (J)                            |
| 3.  | Ability to enrich classroom presentation with cards, tapes, etc. used in actual business practice. | C <input checked="" type="checkbox"/> H <input type="checkbox"/> D N I X (S)<br>C H D N I X (J) |
| 4.  | Ability to teach computer (programming) languages:                                                 |                                                                                                 |
| 4.1 | COBOL                                                                                              | C <input checked="" type="checkbox"/> H <input type="checkbox"/> D N I X (S)<br>C H D N I X (J) |
| 4.2 | Fortran                                                                                            | C <input checked="" type="checkbox"/> H <input type="checkbox"/> D N I X (S)<br>C H D N I X (J) |

|      |                                                                    |                                                                                                                             |
|------|--------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------|
| 4.3  | Basic                                                              | C <input checked="" type="checkbox"/> H <input checked="" type="checkbox"/> D <input checked="" type="checkbox"/> N I X (S) |
|      |                                                                    | C H D N I X (J)                                                                                                             |
| 4.4  | BAL                                                                | C H <input checked="" type="checkbox"/> D <input checked="" type="checkbox"/> N I X (S)                                     |
|      |                                                                    | C H D N I X (J)                                                                                                             |
| 4.5  | Assembler                                                          | C H <input checked="" type="checkbox"/> D <input checked="" type="checkbox"/> N I X (S)                                     |
|      |                                                                    | C H D N I X (J)                                                                                                             |
| 4.6  | PL/I                                                               | C H <input checked="" type="checkbox"/> D <input checked="" type="checkbox"/> N I X (S)                                     |
|      |                                                                    | C H D N I X (J)                                                                                                             |
| 4.7  | RPG                                                                | C H <input checked="" type="checkbox"/> D <input checked="" type="checkbox"/> N I X (S)                                     |
|      |                                                                    | C H D N I X (J)                                                                                                             |
| 4.8  | RPG II                                                             | C H <input checked="" type="checkbox"/> D <input checked="" type="checkbox"/> N I X (S)                                     |
|      |                                                                    | C H D N I X (J)                                                                                                             |
| 4.9  | Prime language of systems                                          | C H <input checked="" type="checkbox"/> D <input checked="" type="checkbox"/> N I X (S)                                     |
|      |                                                                    | C H D N I X (J)                                                                                                             |
| 4.10 | GPSS                                                               | C H <input checked="" type="checkbox"/> D <input checked="" type="checkbox"/> N I X (S)                                     |
|      |                                                                    | C H D N I X (J)                                                                                                             |
| 4.11 | PERT/CPM                                                           | C H <input checked="" type="checkbox"/> D <input checked="" type="checkbox"/> N I X (S)                                     |
|      |                                                                    | C H D N I X (J)                                                                                                             |
| 4.12 | ALGOL                                                              | C H <input checked="" type="checkbox"/> D <input checked="" type="checkbox"/> N I X (S)                                     |
|      |                                                                    | C H D N I X (J)                                                                                                             |
| 4.13 | Machine language                                                   | C H <input checked="" type="checkbox"/> D <input checked="" type="checkbox"/> N I X (S)                                     |
|      |                                                                    | C H D N I X (J)                                                                                                             |
| 5.   | Ability to demonstrate various input/output media.                 | C <input checked="" type="checkbox"/> H <input checked="" type="checkbox"/> D N I X (S)                                     |
|      |                                                                    | C H D N I X (J)                                                                                                             |
| 6.   | Ability to present systems design for data processing application. | C <input checked="" type="checkbox"/> H <input checked="" type="checkbox"/> D N I X (S)                                     |
|      |                                                                    | C H D N I X (J)                                                                                                             |
| 7.   | Ability to demonstrate flow charting.                              | <input checked="" type="checkbox"/> H D N I X (S)                                                                           |
|      |                                                                    | C H D N I X (J)                                                                                                             |
| 8.   | Ability to demonstrate input planning.                             | C <input checked="" type="checkbox"/> H <input checked="" type="checkbox"/> D N I X (S)                                     |
|      |                                                                    | C H D N I X (J)                                                                                                             |

- |                                                                                                 |                                                                        |
|-------------------------------------------------------------------------------------------------|------------------------------------------------------------------------|
| 9. Ability to transfer unit-record concepts to computer concepts.                               | C <input checked="" type="checkbox"/> H D N I X (S)<br>C H D N I X (J) |
| 10. Ability to relate personal business experience in data processing to classroom activities.  | C <input checked="" type="checkbox"/> H D N I X (S)<br>C H D N I X (J) |
| 11. Ability to teach JCL.                                                                       | C H <input checked="" type="checkbox"/> D N I X (S)<br>C H D N I X (J) |
| 12. Ability to compare manual data handling to each of the functions of computer data handling. | C H <input checked="" type="checkbox"/> D N I X (S)<br>C H D N I X (J) |
| 13. Ability to operate the classroom as a data processing office simulation.                    | C <input checked="" type="checkbox"/> H D N I X (S)<br>C H D N I X (J) |

THE TEACHER OF INTRODUCTORY DATA PROCESSING SHOULD UNDERSTAND, DEMONSTRATE, AND EFFECT THE FOLLOWING:

Communication

- |                                                                                                                |                                                                        |
|----------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------|
| 1. Effective speaking skills.                                                                                  | C <input checked="" type="checkbox"/> H D N I X (S)<br>C H D N I X (J) |
| 2. Proper questioning techniques.                                                                              | C <input checked="" type="checkbox"/> H D N I X (S)<br>C H D N I X (J) |
| 3. Familiarity with several media for use in teaching data processing and knowledge of relative value of each. |                                                                        |
| 3.1 Chalkboard                                                                                                 | C <input checked="" type="checkbox"/> H D N I X (S)<br>C H D N I X (J) |
| 3.2 Overhead projector                                                                                         | C <input checked="" type="checkbox"/> H D N I X (S)<br>C H D N I X (J) |
| 3.3 Teaching machines,<br>programmed instruction                                                               | C <input checked="" type="checkbox"/> H D N I X (S)<br>C H D N I X (J) |

|     |                                                                            |   |                                     |   |   |   |   |     |
|-----|----------------------------------------------------------------------------|---|-------------------------------------|---|---|---|---|-----|
| 3.4 | Videotape recorder                                                         | C | <input checked="" type="checkbox"/> | D | N | I | X | (S) |
|     |                                                                            | C | H                                   | D | N | I | X | (J) |
| 3.5 | Tape and/or cassette                                                       | C | <input checked="" type="checkbox"/> | D | N | I | X | (S) |
|     |                                                                            | C | H                                   | D | N | I | X | (J) |
| 3.6 | Motion picture projector                                                   | C | <input checked="" type="checkbox"/> | D | N | I | X | (S) |
|     |                                                                            | C | H                                   | D | N | I | X | (J) |
| 3.7 | Filmstrip projector                                                        | C | <input checked="" type="checkbox"/> | D | N | I | X | (S) |
|     |                                                                            | C | H                                   | D | N | I | X | (J) |
| 3.8 | Auto-Vance Projector<br>(Filmstrip and cassette tape<br>recorder combined) | C | <input checked="" type="checkbox"/> | D | N | I | X | (S) |
|     |                                                                            | C | H                                   | D | N | I | X | (J) |
| 3.9 | Bulletin board                                                             | C | <input checked="" type="checkbox"/> | D | N | I | X | (S) |
|     |                                                                            | C | H                                   | D | N | I | X | (J) |
| 4.  | Provision for teacher-pupil<br>interaction.                                | C | <input checked="" type="checkbox"/> | D | N | I | X | (S) |
|     |                                                                            | C | H                                   | D | N | I | X | (J) |
| 5.  | Use of feedback from interaction<br>for improved teaching.                 | C | <input checked="" type="checkbox"/> | D | N | I | X | (S) |
|     |                                                                            | C | H                                   | D | N | I | X | (J) |
| 6.  | Understanding the importance of<br>nonverbal communication.                | C | <input checked="" type="checkbox"/> | D | N | I | X | (S) |
|     |                                                                            | C | H                                   | D | N | I | X | (J) |
| 7.  | Ability to use nonverbal<br>Communication.                                 | C | <input checked="" type="checkbox"/> | D | N | I | X | (S) |
|     |                                                                            | C | H                                   | D | N | I | X | (J) |
| 8.  | Ability to explain verbally.                                               | C | <input checked="" type="checkbox"/> | D | N | I | X | (S) |
|     |                                                                            | C | H                                   | D | N | I | X | (J) |

THE TEACHER OF INTRODUCTORY DATA PROCESSING  
SHOULD UNDERSTAND, DEMONSTRATE, AND EFFECT  
THE FOLLOWING:

#### Evaluation

|    |                                                               |   |                                     |   |   |   |   |     |
|----|---------------------------------------------------------------|---|-------------------------------------|---|---|---|---|-----|
| 1. | Selection of valid and reliable<br>measurement techniques.    | C | <input checked="" type="checkbox"/> | D | N | I | X | (S) |
|    |                                                               | C | H                                   | D | N | I | X | (J) |
| 2. | Construction of valid and reliable<br>measurement techniques. | C | <input checked="" type="checkbox"/> | D | N | I | X | (S) |
|    |                                                               | C | H                                   | D | N | I | X | (J) |

- |                                                                                              |                                                                                                            |
|----------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------|
| 3. Use of pretest and posttest when applicable.                                              | C <input checked="" type="checkbox"/> H D N I X (S)<br>C H D N I X (J)                                     |
| 4. Self-evaluation of teacher techniques and methods for self-improvement purposes.          | C <input checked="" type="checkbox"/> H D N I X (S)<br>C H D N I X (J)                                     |
| 5. Student evaluation of teacher techniques and methods for purposes of teacher improvement. | C <input checked="" type="checkbox"/> H <input checked="" type="checkbox"/> D N I X (S)<br>C H D N I X (J) |
| 6. Use of student self-evaluation of his learning whenever feasible.                         | C <input checked="" type="checkbox"/> H D N I X (S)<br>C H D N I X (J)                                     |
| 7. Ability to diagnose student difficulties.                                                 | C <input checked="" type="checkbox"/> H D N I X (S)<br>C H D N I X (J)                                     |
| 8. Ability to apply appropriate remedial techniques.                                         | C <input checked="" type="checkbox"/> H D N I X (S)<br>C H D N I X (J)                                     |

THE TEACHER OF INTRODUCTORY DATA PROCESSING  
SHOULD UNDERSTAND, DEMONSTRATE, AND EFFECT  
THE FOLLOWING:

Developing Pupil-Self

- |                                                                                                                             |                                                                        |
|-----------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------|
| 1. Assisting student in accepting responsibility of reaching his goals. (e.g., correct homework procedures, practice, etc.) | C <input checked="" type="checkbox"/> H D N I X (S)<br>C H D N I X (J) |
| 2. Development of ability in student to accept constructive criticism.                                                      | C <input checked="" type="checkbox"/> H D N I X (S)<br>C H D N I X (J) |
| 3. Development of ability in student to work under pressure.                                                                | C <input checked="" type="checkbox"/> H D N I X (S)<br>C H D N I X (J) |
| 4. Development in student of a respect for time, property, and rights of others.                                            | C <input checked="" type="checkbox"/> H D N I X (S)<br>C H D N I X (J) |
| 5. Development of self-confidence in student's own ability.                                                                 | C <input checked="" type="checkbox"/> H D N I X (S)<br>C H D N I X (J) |

- |                                                                                                                |                                                             |
|----------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------|
| 6. Guidance regarding data processing as a vocational possibility, or work with counselor to provide services. | C <input type="checkbox"/> D N I X (S)<br>C H D N I X (J)   |
| 7. Guidance regarding scholarship possibilities for advanced study.                                            | C <input type="checkbox"/> D N I X (S)<br>C H D N I X (J)   |
| 8. Stressing the need for high scholarship to compete for scholarships in advanced training.                   | C <input type="checkbox"/> D N I X (S)<br>C H D N I X (J)   |
| 9. Encouragement of student to work in a part-time office position.                                            | C H <input type="checkbox"/> D N I X (S)<br>C H D N I X (J) |
| 10. Development of ability to work independently through good study habits.                                    | C <input type="checkbox"/> D N I X (S)<br>C H D N I X (J)   |
| 11. Development of ability in student to persevere.                                                            | C <input type="checkbox"/> D N I X (S)<br>C H D N I X (J)   |
| 12. Development of ability to follow instructions.                                                             | C <input type="checkbox"/> D N I X (S)<br>C H D N I X (J)   |
| 13. Development of ability to use reference materials.                                                         | C <input type="checkbox"/> D N I X (S)<br>C H D N I X (J)   |
| 14. Stressing the need for regular attendance in the classroom.                                                | <input type="checkbox"/> H D N I X (S)                      |

THE TEACHER OF INTRODUCTORY DATA PROCESSING SHOULD UNDERSTAND, DEMONSTRATE, AND EFFECT THE FOLLOWING:

Personal Attributes

- |                                                                             |                                                           |
|-----------------------------------------------------------------------------|-----------------------------------------------------------|
| 1. Knowledge of the ethical procedures of a professional.                   | C <input type="checkbox"/> D N I X (S)<br>C H D N I X (J) |
| 2. Establishment of rapport that reflects a positive influence upon pupils. | C <input type="checkbox"/> D N I X (S)<br>C H D N I X (J) |

- |                                                                                 |                                                                        |
|---------------------------------------------------------------------------------|------------------------------------------------------------------------|
| 3. Counseling of students concerning their individual problems.                 | C <input checked="" type="checkbox"/> H D N I X (S)<br>C H D N I X (J) |
| 4. Sensitivity to students' learning problems.                                  | C <input checked="" type="checkbox"/> H D N I X (S)<br>C H D N I X (J) |
| 5. Establishment of rapport with administrative and supervisory personnel.      | C <input checked="" type="checkbox"/> H D N I X (S)<br>C H D N I X (J) |
| 6. Development of students' confidence by never violating their trust.          | <input checked="" type="checkbox"/> H D N I X (S)<br>C H D N I X (J)   |
| 7. Establishing a need for creativity.                                          | C <input checked="" type="checkbox"/> H D N I X (S)<br>C H D N I X (J) |
| 8. Establishment of a positive attitude toward the teaching of data processing. | C <input checked="" type="checkbox"/> H D N I X (S)<br>C H D N I X (J) |
| 9. Ability to use patience with slow learners.                                  | C <input checked="" type="checkbox"/> H D N I X (S)<br>C H D N I X (J) |
| 10. Establishment of proper teacher behavior as an example to student.          | <input checked="" type="checkbox"/> H D N I X (S)<br>C H D N I X (J)   |
| 11. Provision for continuous learning and updating.                             | C <input checked="" type="checkbox"/> H D N I X (S)<br>C H D N I X (J) |
| 12. Development of total dedication to teaching.                                | C <input checked="" type="checkbox"/> H D N I X (S)<br>C H D N I X (J) |
| 13. Participation in in-service data processing workshops and conferences.      | C <input checked="" type="checkbox"/> H D N I X (S)<br>C H D N I X (J) |

Your name \_\_\_\_\_

Address \_\_\_\_\_

\_\_\_\_\_

## APPENDIX L

### Follow-up Letter for Questionnaire III

February 7, 1975

Houston, Texas 77040

Dear Participant:

Questionnaire III was mailed to you on January 17. If at all possible, may I please have your completed questionnaire by February 17. Your response is needed for final analysis of data.

Your cooperation throughout the study is appreciated.

Sincerely,

Mrs. Nora Jo Sherman

njs

APPENDIX M

Competencies Rated Crucial and Highly Desirable

By Authorities and Junior College Teachers

COMPETENCIES RATED CRUCIAL AND HIGHLY DESIRABLE  
BY AUTHORITIES AND JUNIOR COLLEGE TEACHERS

The following list contains those competencies, in the eight areas of Dodl's categories, which were rated crucial and highly desirable by modal consensus of responding authorities and junior college teachers. Also included in the listing below are competencies which received a crucial or highly desirable rating by 50 percent or more of the respondents from either group but which were outside the modal consensus. A category omission indicates that respondents listed no competencies in that area.

The junior college teacher of introductory data processing should understand, demonstrate, and effect the following:

Planning

Crucial by Modal Consensus

Knowledge of the end results--what the student is expected to accomplish by the completion of the course.

Highly Desirable by Modal Consensus

Relationship of the data processing course to other courses and the total school program.

Relationship of the data processing course to positions in industry and business.

Preparation of a syllabus for the teacher's use.

Preparation of supplementary instructional materials.

Preparation of a syllabus for the data processing course.

Development of instructional strategies appropriate to students' learning styles.

Recognition of the need for strategies appropriate to students' stated objectives and students' learning styles.

Provision for various teaching methods using creativity and imagination.

Development of behavioral objectives.

Use of behavioral objectives.

Selection of supplementary materials.

Establishment of grading standards.

Establishment of grading standards based on students' competencies and established objectives.

Collaboration with other data processing teachers, business education teachers, and administrators in planning.

Planning course outline using long-range objectives.

Knowledge of content resulting from practical business experience in positions involving data processing.

Provision for exercises using data processing equipment.

Provision for "hands-on" experience if equipment is available.

Crucial by Authorities and Highly Desirable  
by Junior College Teachers

Use of a syllabus for the data processing course.

Development of data processing concepts to be learned by the students.

Preparation of an adequate lesson plan.

Selection of required course textbooks or materials.

Concepts of data processing to be learned by the students.

Highly Desirable by Authorities and  
Desirable by Junior College Teachers

Selection of appropriate library reference materials.

Highly Desirable by Junior College Teachers  
and Desirable by Authorities

Knowledge of advanced data processing systems for teaching more effectively.

Relationship of the data processing course to the consumer and society.

Collaboration with businesses employing students for updating course content.

AdministrationHighly Desirable by Modal Consensus

The ability to conduct conferences with parents, teachers, and students.

Organization of teaching equipment, materials, etc.

Establishment and maintenance of classroom procedures and routines.

Establishment of rapport with community organizations to facilitate field trips.

Highly Desirable by Junior College Teachers and Desirable by Authorities

Recording of grades in an efficient manner.

Instruction--ContentCrucial by Modal Consensus

Knowledge of data processing terminology.

Knowledge and application of data processing functions.

Knowledge of the electronic computer.

Ability to flow chart.

Highly Desirable by Modal Consensus

Knowledge of use of punched cards.

Knowledge of record planning and layout for various mediums.

Ability to keypunch information in cards.

Knowledge of data-base concepts.

Knowledge about information storage and retrieval.

Knowledge of teleprocessing concepts.

Knowledge of multiprogram concepts.

Knowledge of documentation standards.

Knowledge of interaction of systems and systems analysis.

Knowledge of computer execution of a program.

Knowledge of computer languages: Fortran.

Knowledge of report design.

Crucial by Authorities and Highly Desirable  
by Junior College Teachers

Development of problem-solving ability.

Knowledge and function of automated data processing.

Knowledge of process of printing, calculating, and preparing reports.

Knowledge of computer languages and relative importance of each: COBOL.

Knowledge of input/output media.

Knowledge of computer language hierarchy.

Highly Desirable by Authorities and  
Desirable by Junior College Teachers

Knowledge of the minicomputer.

Ability to construct codes.

Knowledge of algorithmic design.

### Instruction--Methodologies/Techniques

#### Crucial by Modal Consensus

Ability to demonstrate the computer.

Ability to demonstrate flow charting.

#### Highly Desirable by Modal Consensus

Application of psychological principles of learning regarding:

Motivation

Whole vs. part learning

Practice

Transfer of learning

Ability to enrich classroom presentation with cards, tapes, etc., used in actual business practice.

Ability to present systems design for data processing application.

Ability to demonstrate various input/output media.

Ability to transfer unit-record concepts to computer concepts.

Ability to compare manual data handling to each of the functions of computer data handling.

#### Crucial by Authorities and Highly Desirable by Junior College Teachers

Ability to demonstrate the keypunch.

Ability to demonstrate input planning.

Application of psychological principles of learning regarding favorable environment.

Ability to teach computer (programming) languages:

Cobol

Highly Desirable by Junior College Teachers  
and Desirable by Authorities

Ability to teach computer (programming) languages:

Fortran

### Communication

Crucial by Modal Consensus

Provision for teacher-pupil interaction.

Ability to explain verbally.

Highly Desirable by Modal Consensus

Ability to use nonverbal communication.

Crucial by Authorities and Highly Desirable  
by Junior College Teachers

Effective speaking skills.

Proper questioning techniques.

Use of feedback from interaction for improved teaching.

Understanding the importance of nonverbal communication.

Familiarity with several media for use in teaching data processing and knowledge of relative value of each:

Chalkboard  
Overhead projector

### Evaluation

#### Highly Desirable by Modal Consensus

Selection of valid and reliable measurement techniques.

Construction of valid and reliable measurement techniques.

Use of pretest and posttest when applicable.

Self-evaluation of teacher techniques and methods for self-improvement purposes.

Student evaluation of teacher techniques and methods for purposes of teacher improvement.

Use of student self-evaluation of his learning whenever feasible.

#### Crucial by Authorities and Highly Desirable by Junior College Teachers

Ability to diagnose student difficulties.

Ability to apply appropriate remedial techniques.

### Developing Pupil-Self

#### Crucial by Modal Consensus

Development of ability to follow instructions.

Highly Desirable by Modal Consensus

Development in student of ability to work under pressure.

Assisting student in accepting responsibility of reaching his goals (e.g., correct homework procedures, practice, etc.).

Development of ability in student to persevere.

Guidance regarding data processing as a vocational possibility, or work with counselor to provide services.

Crucial by Authorities and Highly Desirable  
by Junior College Teachers

Development of ability to work independently through good study habits.

Development of ability in student to accept constructive criticism.

Development of self-confidence in student's own ability.

Development of ability to use reference materials.

Stressing the need for regular attendance in the classroom.

Development in student of a respect for time, property, and rights of others.

Personal AttributesCrucial by Modal Consensus

Knowledge of ethical procedures of a professional.

Establishment of proper teacher behavior as an example to students.

Highly Desirable by Modal Consensus

Establishment of rapport with administrative and supervisory personnel.

Establishing a need for creativity.

Crucial by Authorities and Highly Desirable  
by Junior College Teachers

Establishment of rapport that reflects a positive influence upon pupils.

Sensitivity to students' learning problems.

Development of students' confidence by never violating their trust.

Establishment of a positive attitude toward the teaching of data processing.

Ability to use patience with slow learners.

Provision for continuous learning and updating.

Development of total dedication to teaching.

Participation in in-service data processing conferences and workshops.

## APPENDIX N

Competencies Rated Crucial and Highly Desirable

By Authorities and High School Teachers

## COMPETENCIES RATED CRUCIAL AND HIGHLY DESIRABLE

### BY AUTHORITIES AND HIGH SCHOOL TEACHERS

The following list contains those competencies, in the eight areas of Dodl's categories, which were rated crucial and highly desirable by modal consensus of responding authorities and high school teachers. Also included in the listing below are competencies which received a crucial or highly desirable rating by 50 percent or more of the respondents from either group but which were outside the modal consensus. A category omission indicates that respondents listed no competencies in that area.

The high school teacher of introductory data processing should understand, demonstrate, and effect the following:

#### Planning

##### Crucial by Modal Consensus

Development of data processing concepts to be learned by the students.

Knowledge of the end results--what the student is expected to accomplish by the completion of the course.

Highly Desirable by Modal Consensus

Relationship of the data processing course to positions in industry and business.

Preparation of a syllabus for the teacher's use.

Preparation of supplementary instructional materials.

Preparation of a syllabus for the data processing course.

Development of instructional strategies appropriate to students' stated objectives and students' learning styles.

Provision for various teaching methods using creativity and imagination.

Development of behavioral objectives.

Selection of supplementary materials.

Establishment of grading standards.

Recognition of the need for strategies appropriate to students' stated objectives and students' learning styles.

Use of behavioral objectives.

Establishment of grading standards based on students' competencies and established objectives.

Collaboration with businesses employing students for updating course content.

Collaboration with other data processing teachers, business education teachers, and administrators in planning.

Planning course outline using long-range objectives.

Knowledge of content resulting from practical business experience in positions involving data processing.

Provision for exercises using data processing equipment.

Provision for exercises using computer program assignments.

Crucial by Authorities and Highly Desirable  
by High School Teachers

Use of a syllabus for the data processing course.

Preparation of an adequate lesson plan.

Selection of required course textbooks or materials.

Concepts of data processing to be learned by the students.

Provision for "hands-on" experience if equipment is available.

Highly Desirable by High School Teachers  
and Desirable by Authorities

Development of preassessment techniques which lead to pupil placement, formal and informal testing, personal interviews and observations, previous grades, etc.

Provision for making available the teaching materials from various manufacturers and data processing associations.

Selection of appropriate library reference materials.

Knowledge of advanced data processing systems for teaching more effectively.

Ability to plan a field trip.

Ability to recommend selection of equipment.

Relationship of the data processing course to consumer and society.

### Administration

#### Crucial by Modal Consensus

Provision for repair and maintenance of equipment if needed.

#### Highly Desirable by Modal Consensus

The ability to conduct conferences with parents, teachers, and students.

Arrangement of physical equipment conducive to a learning environment.

Establishment and maintenance of classroom procedures and routines.

Establishment of smooth classroom routines, including tardiness and absences, paper collection and return.

Crucial by High School Teachers  
and Desirable by Authorities

Maintenance, storage, and retrieval of student records.

Recording of grades in an efficient manner.

Highly Desirable by High School  
Teachers and Desirable by Authorities

Organization of teaching equipment, materials, etc.

Establishment of rapport with community organizations  
to facilitate field trips.

Instruction--Content

Crucial by Modal Consensus

Knowledge of data processing terminology.

Knowledge and application of data processing  
functions.

Highly Desirable by Modal Consensus

Knowledge of use of punched cards.

Knowledge of record planning and layout for  
various mediums.

Ability to construct codes.

Knowledge of the minicomputer.

Knowledge about information storage and retrieval.

Knowledge of documentation standards.

Knowledge of computer languages and relative importance of each:

COBOL

Fortran

Basic

Knowledge of input/output media.

Knowledge of report design.

Crucial by Authorities and Highly  
Desirable by High School Teachers

Development of problem-solving ability.

Knowledge and function of automated data processing.

Knowledge of process of printing, calculating, and preparing reports.

Knowledge of the electronic computer.

Ability to flow chart.

Highly Desirable by High School Teachers  
and Desirable by Authorities

Knowledge of data processing history.

Ability to keypunch information in cards.

Ability to sort and classify data in cards by machine.

Knowledge of key tape as an input device.

Ability to use decision tables.

Knowledge of computer execution of a program.

Knowledge of computer language hierarchy.

Highly Desirable by Authorities  
and Desirable by High School Teachers

Knowledge of data-base concepts.

Knowledge of multiprogram concepts.

Knowledge of interaction of systems and  
systems analysis.

Instruction--Methodologies/ Techniques

Crucial by Modal Consensus

Ability to demonstrate flow charting.

Highly Desirable by Modal Consensus

Application of psychological principles of learning  
regarding:

Practice

Whole vs. part learning

Motivation

Ability to teach computer (programming) languages:

COBOL

Ability to present systems design for data processing  
application.

Ability to transfer unit-record concepts to computer concepts.

Crucial by Authorities and Highly  
Desirable by High School Teachers

Ability to demonstrate the keypunch.

Ability to enrich classroom presentation with cards, tapes, etc., used in actual business practice.

Application of psychological principles of learning regarding favorable environment.

Ability to demonstrate the various input/output media.

Ability to demonstrate input planning.

Crucial by High School Teachers and  
Highly Desirable by Authorities

Ability to demonstrate the computer.

Application of psychological principles of learning regarding transfer of learning.

Highly Desirable by Authorities  
and Desirable by Teachers

Ability to compare manual data handling to each of the functions of computer data handling.

Highly Desirable by High School Teachers  
and Desirable by Authorities

Application of psychological principles of learning regarding relaxation.

Ability to demonstrate the verifier.

Ability to demonstrate the sorter.

Ability to teach computer (programming) languages:

Fortran

Basic

Ability to relate personal business experience in data processing to classroom activities.

Ability to operate the classroom as a data processing office simulation.

### Communication

#### Highly Desirable by Modal Consensus

Familiarity with several media for use in teaching data processing and knowledge of relative value of each: bulletin board.

Ability to use nonverbal communication.

#### Crucial by Authorities and Highly Desirable by High School Teachers

Effective speaking skills.

Proper questioning techniques.

Familiarity with several media for use in teaching data processing and knowledge of relative value of each:

Chalkboard

Overhead projector

Provision for teacher-pupil interaction.

Use of feedback from interaction for improved teaching.

Understanding the importance of nonverbal communication.

Ability to explain verbally.

Highly Desirable by High School Teachers  
and Desirable by Authorities

Familiarity with several media for use in teaching data processing and knowledge of relative value of each:

Teaching machines, programmed instruction  
Videotape recorder  
Tape and/or cassette recorder  
Motion picture projector  
Filmstrip projector  
Auto-Vance Projector (filmstrip and cassette  
tape recorder combined)

Evaluation

Highly Desirable by Modal Consensus

Construction of valid and reliable measurement techniques.

Use of pretest and posttest when applicable.

Self-evaluation of teacher techniques and methods for self-improvement purposes.

Use of student self-evaluation of his learning whenever feasible.

Crucial by Authorities and Highly  
Desirable by High School Teachers

Selection of valid and reliable measurement techniques.

Ability to diagnose student difficulties.

Ability to apply appropriate remedial techniques.

Developing Pupil-Self

Crucial by Modal Consensus

Stressing the need for regular attendance in the classroom.

### Highly Desirable by Modal Consensus

Assisting student in accepting responsibility of reaching his goals (e.g., correct homework procedures, practice, etc.).

Development of ability in student to accept constructive criticism.

Development of ability in student to work under pressure.

Guidance regarding data processing as a vocational possibility, or work with counselor to provide services.

Development of ability in student to persevere.

Development of ability to use reference materials.

### Crucial by Authorities and Highly Desirable by High School Teachers

Development in student of a respect for time, property, and rights of others.

Development of self-confidence in student's own ability.

Development of ability to work independently through good study habits.

Development of ability to follow instructions.

### Highly Desirable by High School Teachers and Desirable by Authorities

Guidance regarding scholarship possibilities for advanced study.

Stressing the need for high scholarship to compete for scholarships in advanced training.

## Personal Attributes

### Crucial by Modal Consensus

Development of students' confidence by never violating their trust.

Establishment of proper teacher behavior as an example to students.

### Highly Desirable by Modal Consensus

Establishment of rapport with administrative and supervisory personnel.

Establishing a need for creativity.

### Crucial by Authorities and Highly Desirable by High School Teachers

Knowledge of the ethical procedures of a professional.

Establishment of rapport that reflects a positive influence upon pupils.

Counseling of students concerning their individual problems.

Establishment of a positive attitude toward the teaching of data processing.

Ability to use patience with slow learners.

Provision for continuous learning and updating.

Development of total dedication to teaching.

Participation in in-service data processing conferences and workshops.

Sensitivity to students' learning problems.

APPENDIX O

Competencies Rated Crucial and Highly Desirable

By High School and Junior College Teachers

COMPETENCIES RATED CRUCIAL AND HIGHLY DESIRABLE  
BY HIGH SCHOOL AND JUNIOR COLLEGE TEACHERS

Contained in the following list are competencies, in the eight areas of Dodl's categories, which were rated crucial and highly desirable by modal consensus of responding high school and junior college teachers. Also included in the listing below are competencies which received a crucial or highly desirable rating by 50 percent or more of the respondents from either group but which were outside the modal consensus. A category omission indicates that respondents listed no competencies in that area.

The high school and junior college teacher of introductory data processing should understand, demonstrate, and effect the following:

Planning

Crucial by Modal Consensus

Knowledge of the end results--what the student is expected to accomplish by the completion of the course.

Crucial by High School Teachers and  
Highly Desirable by Junior College Teachers

Development of data processing concepts to be learned by the students.

Highly Desirable by Modal Consensus

Relationship of the data processing course to positions in industry and business.

Relationship of the data processing course to the consumer and society.

Preparation of a syllabus for the teacher's use.

Preparation of supplementary instructional materials.

Preparation of a syllabus for the data processing course.

Use of a syllabus for the data processing course.

Preparation of an adequate lesson plan.

Development of instructional strategies appropriate to students' stated objectives and students' learning styles.

Recognition of the need for strategies appropriate to students' stated objectives and students' learning styles.

Provision for various teaching methods using creativity and imagination.

Development of behavioral objectives.

Use of behavioral objectives.

Selection of required course textbooks or materials.

Selection of supplementary materials.

Establishment of grading standards.

Establishment of grading standards based on students' competencies and established objectives.

Collaboration with other data processing teachers, business education teachers, and administrators in planning.

Collaboration with businesses employing students for updating course content.

Planning course outline using long-range objectives.

Knowledge of content resulting from practical business experience in positions involving data processing.

Knowledge of advanced data processing systems for teaching more effectively.

Provision for exercises using data processing equipment.

Provision for "hands-on" experience if equipment is available.

Concepts of data processing to be learned by the students.

Provision for exercises using computer program assignments.

Highly Desirable by High School Teachers  
and Desirable by Junior College Teachers

Provision for making available the teaching materials from various manufacturers and data processing associations.

Selection of appropriate library reference materials.

Ability to plan a field trip.

Ability to recommend selection of equipment.

Development of preassessment techniques which lead to pupil placement, formal and informal testing, personal interviews and observations, previous grades, etc.

Highly Desirable by Junior College Teachers  
and Desirable by High School Teachers

Relationship of the data processing course to other courses  
and the total school program.

Administration

Crucial by High School Teachers and Highly  
Desirable by Junior College Teachers

Maintenance, storage, and retrieval of student records.

Recording of grades in an efficient manner.

Highly Desirable by Modal Consensus

The ability to conduct conferences with parents, teachers,  
and students.

Organization of teaching equipment, materials, etc.

Establishment and maintenance of classroom procedures  
and routines.

Establishment of smooth classroom routines, including  
tardiness and absences, paper collection and return.

Establishment of rapport with community organizations  
to facilitate field trips.

Highly Desirable by High School Teachers and  
Desirable by Junior College Teachers

Arrangement of physical equipment conducive to a  
learning environment.

Instruction--ContentCrucial by Modal Consensus

Knowledge of data processing terminology.

Knowledge and application of data processing functions.

Crucial by Junior College Teachers and Highly  
Desirable by High School Teachers

Knowledge of the electronic computer.

Ability to flow chart.

Highly Desirable by Modal Consensus

Knowledge of data processing history.

Development of problem-solving ability.

Knowledge and function of automated data processing.

Knowledge of use of punched cards.

Knowledge of record planning and layout for various  
mediums.

Ability to keypunch information in cards.

Knowledge of process of printing, calculating, and  
preparing reports.

Knowledge about information storage and retrieval.

Knowledge of documentation standards.

Knowledge of computer execution of a program.

Knowledge of computer language hierarchy.

Knowledge of computer languages and relative importance of each:

COBOL  
Fortran

Knowledge of input/output media.

Knowledge of report design.

Highly Desirable by High School Teachers  
and Desirable by Junior College Teachers

Ability to construct codes.

Ability to sort and classify data in cards by machine.

Knowledge of the minicomputer.

Ability to use decision tables.

Knowledge of key tape as an input device.

Highly Desirable by Junior College Teachers  
and Desirable by High School Teachers

Knowledge of teleprocessing concepts.

Instruction--Methodologies/Techniques

Crucial by Modal Consensus

Ability to demonstrate the computer.

Ability to demonstrate flow charting.

Crucial by High School Teachers and  
Highly Desirable by Junior College Teachers

Application of psychological principles of learning regarding transfer of learning.

Highly Desirable by Modal Consensus

Application of psychological principles of learning regarding:

Whole vs. part learning  
Favorable environment  
Motivation  
Practice

Ability to demonstrate:

Sorter  
Keypunch

Ability to enrich classroom presentation with cards, tapes, etc., used in actual business practice.

Ability to teach computer (programming) languages:

COBOL  
Fortran

Ability to demonstrate various input/output media.

Ability to present systems design for data processing application.

Ability to demonstrate input planning.

Ability to transfer unit-record concepts to computer concepts.

Ability to relate personal business experience in data processing to classroom activities.

Highly Desirable by High School Teachers and  
Desirable by Junior College Teachers

Application of psychological principles of learning regarding relaxation.

Ability to demonstrate the verifier.

Ability to teach computer (programming) languages: Basic.

Ability to operate the classroom as a data processing office simulation.

### Communication

#### Crucial by Junior College Teachers and Highly Desirable by High School Teachers

Ability to explain verbally.

Provision for teacher-pupil interaction.

#### Highly Desirable by Modal Consensus

Effective speaking skills.

Proper questioning techniques.

Familiarity with several media for use in teaching data processing and knowledge of relative value of each:

Chalkboard  
Overhead projector

Use of feedback from interaction for improved teaching.

Understanding the importance of nonverbal communication.

Ability to use nonverbal communication.

#### Highly Desirable by High School Teachers and Desirable by Junior College Teachers

Familiarity with several media for use in teaching data processing and knowledge of relative value of each:

Teaching machines, programmed instruction

Videotape recorder  
 Tape and/or cassette recorder  
 Motion picture projector  
 Filmstrip projector  
 Auto-Vance Projector (filmstrip and cassette tape  
 recorder combined)  
 Bulletin board

### Evaluation

#### Highly Desirable by Modal Consensus

Selection of valid and reliable measurement techniques.  
 Construction of valid and reliable measurement techniques.  
 Use of pretest and posttest when applicable.  
 Self-evaluation of teacher techniques and methods for  
 self-improvement purposes.  
 Use of student self-evaluation of his learning whenever  
 feasible.  
 Ability to diagnose student difficulties.  
 Ability to apply appropriate remedial techniques.

#### Highly Desirable by Junior College Teachers and Desirable by High School Teachers

Student evaluation of teacher techniques and methods for  
 purposes of teacher improvement.

### Developing Pupil-Self

#### Crucial by High School Teachers and Highly Desirable by Junior College Teachers

Stressing the need for regular attendance in the classroom.

Crucial by Junior College Teachers and  
Highly Desirable by High School Teachers

Development of ability to follow instructions.

Highly Desirable by Modal Consensus

Assisting student in accepting responsibility of reaching his goals (e.g., correct homework procedures, practice, etc.).

Development of ability in student to accept constructive criticism.

Development of ability in student to work under pressure.

Development in student of a respect for time, property, and rights of others.

Development of self-confidence in student's own ability.

Guidance regarding data processing as a vocational possibility, or work with counselor to provide services.

Development of ability to work independently through good study habits.

Development of ability in student to persevere.

Development of ability to use reference materials.

Highly Desirable by High School Teachers and  
Desirable by Junior College Teachers

Guidance regarding scholarship possibilities for advanced study.

Stressing the need for high scholarship to compete for scholarships in advanced training.

Personal AttributesCrucial by Modal Consensus

Establishment of proper teacher behavior as an example to students.

Highly Desirable by Modal Consensus

Establishment of rapport that reflects a positive influence upon pupils.

Counseling of students concerning their individual problems.

Sensitivity to students' learning problems.

Establishment of rapport with administrative and supervisory personnel.

Establishing a need for creativity.

Establishment of a positive attitude toward the teaching of data processing.

Ability to use patience with slow learners.

Provision for continuous learning and updating.

Development of total dedication to teaching.

Participation in in-service data processing conferences and workshops.

Highly Desirable by High School Teachers and  
Crucial by Junior College Teachers

Knowledge of the ethical procedures of a professional.

Highly Desirable by Junior College Teachers  
and Crucial by High School Teachers

Development of students' confidence by never violating their trust.

## APPENDIX P

Competencies Found to be Significantly Different  
in the Reporting of the Three Groups

COMPETENCIES FOUND TO BE SIGNIFICANTLY DIFFERENT  
IN THE REPORTING OF THE THREE GROUPS

Chi-square values were computed to determine significant differences in the reporting of the three groups. The following competencies, in the eight areas of Dodl's categories, were found to be significantly different at the .05 level of confidence:

The teacher of introductory data processing should understand, demonstrate, and effect the following:

Planning

Authorities and Junior College Teachers

Preparation of supplementary instructional materials.

Use of a syllabus for the data processing course.

Development of data processing concepts to be learned by the students.

Preparation of an adequate lesson plan.

Concepts of data processing to be learned by the students.

Authorities and High School Teachers

Relationship of the data processing course to other courses and the total school program.

Relationship of the data processing course to the consumer and society.

Use of a syllabus for the data processing course.

Ability to recommend selection of equipment.

High School and Junior College Teachers

Ability to recommend selection of equipment.

Administration

Authorities and Junior College Teachers

Recording of grades in an efficient manner.

Authorities and High School Teachers

Organization of teaching equipment, materials, etc.

Maintenance, storage, and retrieval of student records.

High School and Junior College Teachers

Arrangement of physical equipment conducive to a learning environment.

Maintenance, storage, and retrieval of student records.

Recording of grades in an efficient manner.

Content

Authorities and Junior College Teachers

Knowledge of data processing terminology.

Knowledge of record planning and layout for various mediums.

Knowledge and application of data processing functions.

Development of problem-solving ability.

Knowledge and function of automated data processing.

Ability to construct codes.

Knowledge of process of printing, calculating, and preparing reports.

Knowledge of the minicomputer.

Knowledge of computer language hierarchy.

Knowledge of computer languages: Basic.

#### Authorities and High School Teachers

Knowledge of data processing history.

Development of problem-solving ability.

Knowledge of process of printing, calculating, and preparing reports.

Knowledge and function of automated data processing.

Knowledge of the electronic computer.

Knowledge of interaction of systems and systems analysis.

Knowledge of computer execution of a program.

Knowledge of key tape as an input device.

Knowledge of computer language hierarchy.

#### High School and Junior College Teachers

Knowledge of the unit-record control panel.

Ability to use decision tables.

Knowledge of record planning and layout for various mediums.

Knowledge of the interaction of systems and systems analysis.

Ability to flow chart.

### Methodologies/Techniques

#### Authorities and Junior College Teachers

Application of psychological principles of learning regarding:

Favorable environment  
Relaxation

Ability to demonstrate the keypunch.

Ability to demonstrate report design.

Ability to teach computer (programming) languages:

Fortran  
BAL  
Assembler  
Prime language of systems  
Machine language

Ability to demonstrate input planning.

Ability to relate personal business experience in data processing to classroom activities.

#### Authorities and High School Teachers

Application of psychological principles of learning regarding:

Favorable environment  
Relaxation  
Transfer of learning

Ability to demonstrate the verifier.

Ability to demonstrate the sorter.

Ability to demonstrate the keypunch.

Ability to teach computer (programming) languages:

- COBOL
- Assembler
- Prime language of systems
- GPSS
- ALGOL
- Machine language

Ability to demonstrate input planning.

Ability to relate personal business experience in data processing to classroom activities.

Ability to compare manual data handling to each of the functions of computer data handling.

#### High School and Junior College Teachers

Application of psychological principles of learning regarding:

- Favorable environment
- Relaxation
- Transfer of learning

Ability to demonstrate the verifier.

Ability to teach computer (programming) languages: Fortran.

#### Communication

##### Authorities and Junior College Teachers

Proper questioning techniques.

Use of feedback from interaction for improved teaching.

Effective speaking skills.

Understanding the importance of nonverbal communication.

### Authorities and High School Teachers

Effective speaking skills.

Proper questioning techniques.

Familiarity with several media for use in teaching data processing and knowledge of relative value of each:

- Chalkboard
- Overhead projector
- Videotape recorder
- Tape and/or cassette recorder
- Motion picture projector
- Filmstrip projector
- Auto-Vance projector

Provision for teacher-pupil interaction.

Use of feedback from interaction for improved teaching.

Understanding the importance of nonverbal communication.

Ability to explain verbally.

### High School and Junior College Teachers

Familiarity with several media for use in teaching data processing and knowledge of relative value of each:

- Filmstrip projector
- Auto-Vance projector
- Bulletin board
- Motion picture projector

Ability to explain verbally.

### Evaluation

#### Authorities and Junior College Teachers

Selection of valid and reliable measurement techniques.

Ability to diagnose student difficulties.

Ability to apply appropriate remedial techniques.

#### Authorities and High School Teachers

Student evaluation of teacher techniques and methods for purposes of teacher improvement.

Selection of valid and reliable measurement techniques.

Ability to diagnose student difficulties.

Ability to apply appropriate remedial techniques.

#### High School and Junior College Teachers

Student evaluation of teacher techniques and methods for purposes of teacher improvement.

### Developing Pupil-Self

#### Authorities and Junior College Teachers

Development of self-confidence in student's own ability.

Development of ability to work independently through good study habits.

#### Authorities and High School Teachers

Development in student of a respect for time, property, and rights of others.

Development of self-confidence in student's own ability.

Guidance regarding scholarship possibilities for advanced study.

Development of ability to work independently through good study habits.

Development of ability to follow instructions.

### High School and Junior College Teachers

Stressing the need for high scholarship to compete for scholarships in advanced training.

Development of ability to follow instructions.

### Personal Attributes

#### Authorities and Junior College Teachers

Sensitivity to students' learning problems.

Establishment of a positive attitude toward the teaching of data processing.

Ability to use patience with slow learners.

Development of total dedication to teaching.

Participation in in-service data processing conferences and workshops.

#### Authorities and High School Teachers

Knowledge of the ethical procedures of a professional.

Sensitivity to students' learning problems.

Establishing a need for creativity.

Establishment of a positive attitude toward the teaching of data processing.

Ability to use patience with slow learners.

Provision for continuous learning and updating.

Development of total dedication to teaching.

Participation in in-service data processing workshops and conferences.

Counseling of students concerning their individual problems.

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