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REPORTED WORKER CHARACTERISTICS FOR ENTRY-LEVEL EMPLOYEES IN INFORMATION PROCESSING

The University of Oklahoma PH.D. 1981

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THE UNIVERSITY OF OKLAHOMA

GRADUATE COLLEGE

REPORTED WORKER CHARACTERISTICS FOR ENTRY-LEVEL EMPLOYEES IN INFORMATION PROCESSING

A DISSERTATION

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BY

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1981

REPORTED WORKER CHARACTERISTICS

FOR ENTRY-LEVEL EMPLOYEES

IN INFORMATION PROCESSING

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To Ethel Elnora Welch, my Mother.

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REPORTED WORKER CHARACTERISTICS FOR ENTRY-LEVEL EMPLOYMENT IN INFORMATION PROCESSING

CHAPTER I

INTRODUCTION

An educational institution that fails to meet the needs of its student body soon stagnates or finds itself replaced by an institution flexible enough to fulfill the demands of changing times. History is replete with examples of institutional death caused by this failure. Many of the liberal arts colleges of the early 1900's refused to alter their curriculum, and today state supported technical schools and universities attract the bulk of the populace.

Perhaps it is within the realm of institutional rights for private colleges to pursue the curriculum of their choice. However, the public colleges and universities do not have this option since, by definition, they owe their allegiance to the taxpayers who make their existence possible. Not only to insure survival, but to satisfy its obligation to the community, must a public-funded institution meet the changing needs of the population served in the area.

In today's rapidly changing world, there is a greater need than ever before for constant vigilance to determine the objectives and content of the curriculum within the individual institution's courses and programs.

Most people may not believe computers have caused as great a revolution as Serguller when he stated that ". . . the change in the human scene by computers will be greater than by any other human invention in the past."[1] One might not wish to carry it to the extent of Kibler and Campbell who prophesied that, "This would seem to be the beginning of an intellectual and cultural revolution of the same magnitude as that started by the advent of the printing press and movable type."[2] Most would agree with Parker concerning the changing role of the worker.

> The economic crisis of the mid-70's was a symptom of a social transition caused by the shift of the major industrial societies to postindustrial societies. The postindustrial society is one in which the dominant labor activity is information processing rather than industrial production.[3]

Were it not for our expanding technology, this avalanche of paperwork would overwhelm the business world. The computer appears necessary.

> The Organization for Economic Cooperation and Development forecast that in 1985-87, six or seven times the present volume of new information will be produced. But by 1987, the degree of automation of information will approach a hundred times that of today. Thus machines will do even more of the work of coping with the flood of information.[4]

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[1]Gerhardt Serguller, "Computer Science and the Quality of Future Computer Specialist's Education," paper submitted to Seminar on Training Policies for Computer Manpower, sponsored by Organization for Economic Cooperation and Development, Paris, May 1975.

[2]Tom. R. Kibler and Patricia B. Campbell, "Writing and Computing Skills of the Future," Educational Technology 16 (September 1976):44.

[3]Edwin B. Parker, "Social Implications of Computer/Telecommunications Systems," paper presented at the conference on Computer/Telecommunications Policies, Paris, February 1974.

[4]Walter M. Mathews and Shirley A. Hallblade, "Computer, Society and Schools," paper presented at conference of Computer Networks Workshop and Guidance of Association for Educational Data Systems, Phoenix, Arizona, 1977.

A large percent of our work force is already employed in the computer area. In 1978, 666,000 persons worked as console, auxiliary equipment and keypunch operators; 247,000 were employed as programmers; and 182,000 worked as systems analysts. The rate of increase has been on a scale of 83% since 1970. The number of systems analysts is expected to more than double in the next decade.[1] This does not begin to represent the thousands of jobs requiring knowledge of computers such as all types of management.

"The need of management to keep in touch with changes in computer technology is an accepted truism . . . ."[2] "Managers who have little knowledge of today's technology are arbitrary and even capricious in their expectations and evaluations."[3]

Connell lamented the past:

> In the 60's and 70's, senior management, blinded by the cloud of technological jargon surrounding the computer field, abdicated its responsibilities and let the data processing function grow, unfettered by normal management controls. The results were predictable. In too many cases, data processing became a bureaucratic empire, outside the mainstream of the business, unresponsive to business requirements and economically unmanageable.[4]

Connell continued:

> Beginning in the late 70's, the senior management recognized its error and began the process, sometimes smooth but more often

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[1]U.S. Department of Labor, Bureau of Labor Statistics, "Computer and Related Occupations," Occupational Outlook Handbook, 1980-81 Edition, no. 2075 (Washington, D.C.: Government Printing Office), pp. 96-101.

[2]Richard A. Bassier, "The Education of Tomorrow's DP Manager," paper presented for Convention of Educational Data Systems, Phoenix, Arizona, May 1976.

[3]Linda B. Tilton, "Word Processing Management: Five Causes of Growing Pains," The Office 90 (October 1979):31.

[4]John J. Connell, "The Fallacy of Information Resource Management," Infosystems 28 (May 1981):78.

> bloody, of bringing data processing back into the business, subjecting it to more effective management measures, integrating its activities into the business plan, charting directions, assigning priorities, and managing the function in a businesslike way. The transition has not been easy . . . however, data processing, or information processing, if one prefers, has been restructured to meet the requirements of business.[1]

Many factors indicate that a person cannot truly be considered educated without some knowledge of computer science. Learning about the implications of computers must be one of the basic courses in the contemporary classroom. In a matter of only a few years, people who know nothing about computers will be among the educationally disadvantaged portions of the population.[2]

There is much agreement on the need for computer education, but the question of who should be responsible for developing computer literacy and providing professional computer programs is often debated. Archibald and Datzper contended, concerning the training of professionals in the computer industry:

> . . . programs in computer science at academic institutions do not provide the preparation required for the practice of computer science in industry. The problem is due primarily, but not exclusively, to the failure of academic institutions to consider the needs of industry, to the failure of business to make its needs known to academic institutions, and to the general lack of communication between these communities.[3]

Archibald and Datzper gave industries' view of their own training programs.

> Industry training, by being oriented around corporate profits is generally inadequate and usually falls far below professional

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[1]Ibid.

[2]"The Place of Computers in Education," A Curriculum Guide in BCL Bulletin by Radio Shack, 1979, p. 3.

[3]J. A. Archibald, Jr., and M. Datzper, "On the Preparation of Computer Science Professionals in Academic Institutions," paper presented to National Computer Conference in Chicago, (Illinois) May 1974.

> standards. Industry hires graduates with majors in their areas of interest, and hastily trains them in computer skills. Industry training does, indeed, tend to be very shallow. People trained in industry are usually trained for a very specific task--with neither breadth nor depth.[1]

Kapur addressed the same problem as follows:

> . . . educational institutions do not prepare their graduates for real-life situations. Coupled with this dilemma of inadequately prepared new graduates is the problem of an abundance of poorly trained, underqualified, and inefficient data processors. Only by sincere and conscientious steps taken by industry and educational institutes can the problems be alleviated significantly.[2]

There appears to be a universal trend urging industry and education to stop living apart and start collaborating in their efforts to train personnel for the age of automation.

> No astute businessman would ignore current economic conditions, changing social values, political events, or new technological advances when planning his future activities. And he would never ignore the consumer who purchases his outputs. Likewise institutions of higher education are profoundly aware of changes in the social, economic, political, and technological environments that may and do affect their operations. Ironically, however, the marketplace (those firms that hire our graduates) is often ignored completely when it comes to the development of a curriculum.[3]

Part of the problem of inadequate curriculums may stem from the Association of Computing Machinery. This appears to be the controlling organization for the major associations of data processing, information processing, computer engineering, and all related computer science areas. In researching the ACM (Association of Computing Machinery) committee's recommendations for Curriculum '78, it was found that of the fifty

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[1]Ibid.

[2]Gopal Kapur, speech given at Data Processing Management Association workshop, Park Ridge (Illinois) July 1976.

[3]David Hill and Morris L. Mayer, "Developing a Curriculum from the Outside-in," Computing Newsletter 8 (April 1975):22.

persons providing direct input nearly all were noted academicians.[1] Granted they are well respected and many are internationally known, but there seemed to be a lack of input from business and industry.

Most schools use the guidelines set by ACM when planning a course of study for computer science. ACM separates computer science into four different tracks: computer science, computer engineering, information systems, and data processing. It would require an extremely large university to be able to meet the guidelines set in each of the four programs. The division in curriculum is more conceptual in an academic environment than practical in a productive world. An example would be the distinction between an information analyst and a systems analyst. The information analyst has a deep understanding of organizations, organizational functions, decision-making, etc.; whereas, the systems analyst has a broad knowledge of hardware and software.[2] The author who made the distinction between the two acknowledges the fact that in most companies the jobs are not split but one person "usually titled 'systems analyst' is expected to function in the whole framework."[3]

> . . . the systems analyst from an academic background of business plus information systems major will be most qualified to be an information analyst because he or she will have the necessary organizational knowledge plus information skills to define requirements and do the general design of a suitable system.[4]

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[1]"ACM Computer Science Curriculum '78," Computing Newsletter 11 (November 1977):2.

[2]Gordon B. Davis, "Information Systems Curricula in the Business School," Interface: The Computer Education Quarterly 1 (Winter 1979):4.

[3]Ibid., p. 5. [4]Ibid.

According to Cook:

> Business-oriented computer science programs are extremely scarce . . . academia has grossly failed in providing the type of curriculum that is required to produce computer science graduates with the expertise to immediately make meaningful contributions to industry.[1]

If there is any concept upon which vocational educators might agree, it would be that a curriculum cannot be designed that would be adequate for an extended period of time. This is classically exemplified by a major behavioral objective listed in a publication funded through the Vocational Education Amendment of 1968 and published in the early 1970's. Six behavioral objectives were enumerated for Data Processing. The third stated, "Wire a control panel for an accounting machine . . . ."[2] Within a relatively short span of time, this was as obsolete in the United States as the hand-driven comptometer.

Dressel has stressed that without any periodic revision of the curriculums, courses tend to increase without any apparent rationale, and that most courses and curriculums are added without sufficient information evaluation.[3]

As early as 1968, a national study was conducted by the United States Office of Education, Bureau of Research, pertaining to automated data processing for educational institutions. The problem was to "determine the implications of integrated data processing for the

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[1]James R. Cook, Michael C. Gallagher, and Marvin A. Johnston, "An Analytical Study of Industry's Computer Education Needs," Interface: The Computer Education Quarterly 1 (Winter 1979):52-53.

[2]Morton Tener, Business Education Curriculum Guides for the 70's (New Jersey Business Education Association, et al. 1972), p. 56.

[3]Paul L. Dressel, College and University Curriculum, 2d ed. (Berkley, 1971), p. 234.

preparation of office workers as it affects the development of office curricula."[1]

The study noted the term "'integrated mechanical data processing' would be more precise, but the modern and common term is 'integrated data processing.'" The United States has since not only moved through the era of mechanical data processing, but in addition through electromechanical data processing and some writers believe we are now in the fourth generation of electronic machines with new applications and usages being heralded daily.[2]

> In the beginning (approximately 20 years ago), computer education was limited to a very few academic institutions. The first data processing and computer courses were usually offered at major universities and as part of the engineering and/or mathematics programs. The first computer courses were usually research oriented rather than applications oriented as a majority of the computer resources are today.[3]

In a field as dynamic as the computer field, courses must be changed and/or added frequently in an effort to keep up with the state of the art.[4]

Stocker stipulated:

> The lifestyle we have become accustomed to would be unknown and impossible to achieve if not for the computer revolution. Yet, tradition seems to be the governing voice in business education. Conventionally taught typewriting, shorthand, and bookkeeping/accounting are still the mainstays of most programs despite the fact that the demand for traditionally taught students is declining. If business education is to survive in this new

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[1]F. Kendrick Bangs, Curricular Implications of Automated Data Processing for Educational Institutions (Boulder: U.S. Department of Health, Education, and Welfare, 1968), p. 14.

[2]Gerald E. Wagner, "A Case for Articulation in Business Data Processing," Business Education Forum 33 (October 1978):16.

[3]Ibid., p. 17.

[4]Pender M. McCarter, "Where is the Industry Going?" Datamation 24 (February 1978):99.

> environment, new methods and new courses will need to be incorporated into the curriculum. These new methods and new courses must involve the use of computers.[1]

Stocker further emphasized:

> The handwriting is on the wall. The future of business education will depend on how well the use of the computer-based office technology is integrated into the overall program and how well students are prepared to work in that environment. The time for talking is past; the time for action is here.[2]

According to McCarter: "Total user spending on data processing in the United States will rise from 2.1 percent of the Gross National Product in 1970 to 13 percent in 1990, and from $101 per capita to $1,253."[3]

McCarter also predicted: "By 1990, as many as one in five of the U.S. labor force will require some knowledge of data processing. In addition, by that year more than six out of ten in the U.S. labor force will depend in some way on data processing."[4]

The state of the art is changing rapidly in the "real world of business" as evidenced by the Seventh International Information Management Exposition, INFO 80, October, 1980.

It included demonstrations of equipment for data processing, word processing, office automation, data communication, information transmissions, records retention and retrievel, and micrographics. There were demonstrations of computers, computer peripherals and accessories, software, magnetic media and dictation, electronic mail, duplicating, and telephone systems.

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[1]H. Robert Stocker, "Integrating Computer-Based Technology in the Total Business Education Program," Business Education Forum 35 (February 1981):25.

[2]Ibid., p. 27. [3]McCarter, p. 99. [4]Ibid.

The theme of the conference was to emphasize the convergence of technology, office systems, data processing and communications into a coherent system which would put information and information processing into the hands of anyone who creates, retrieves, analyzes, transmits or files information.[1]

As we usher in the decade of the 1980's, just about the most significant technological innovation in data processing is the advent of the multifunction computer--systems that blend four vital elements: data processing, voice processing, word processing, and electronic message systems.[2]

In the same article, Hosage, General Manager of Datapoint Corp., maintains, "The office will be viewed as the last bastion of unautomated business processing. Electronic message systems, FAX switching, word processing, automated voice communications will be added to data processing . . . ."[3]

The International Word Processing (IWP) Association projected that in the 1980's, automated text-editing equipment (basically microcomputers with various forms of add-on memory) will be as common to offices as the electric typewriter is at the present time. IWP asserted that "due to quantum leaps in computer technology, as already evidenced in recent market introductions, text-editing terminals will be performing multiple functions such as data processing, data entry,

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[1]Allen J. Krowe, "INFO 80," Infosystems 27 (September 1980):65.

[2]Daniel R. Carter, David T. Zeiter, and John Clark, Jr., "Multifunction Computers Come of Age," Modern Office Procedures 24 (January 1980):67.

[3]Ibid.

electronic mail, distributed DP, and access to electronically filed documents."[1]

Electronic technology is not the office of the future--office computing is becoming a way of life for business and industry. Many businesses have integrated office systems with many others moving in the direction of office systems.

> Office system activities, within the larger system of the business firm, consist of three subsystems which are a communication subsystem, a processing subsystem, and a storage subsystem. Office systems are interwoven combinations of people, processes, and equipment. The end result is a professional office employee, released from routine tasks, assuming more administrative responsibility.[2]

Licata and Inzinga referred to "other real skills" as skills which traditionally have been associated with the education of people to enable them to secure employment in the offices of business and industry. They concur that "today these 'other real skills' are no longer marketable without an accompanying knowledge of the computer and its applications in the workplace."[3]

With the avalance of rhetoric being proliferated in our periodicals illustrating the agreement between practitioners and academicians as to the need for integrated technology within our offices, one would believe formal research covering the total office technology would abound. Such is not the case. Formal research is being completed and has been completed by many individuals, organizations, and companies.

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[1]G. Daryl Nord, "Interfacing Word Processing and Data Processing," Business Education Forum 33 (April 1979):21.

[2]Anthony G. Porreca, Helen Petree, and Carolyn Sheddan, "The Office Systems Concept," Business Education Forum 33 (March 1979):7.

[3]Christine M. Licata and Joan M. Inzinga, "The Chip That Roared: Of Micros and Men," Business Education Forum 35 (April 1981):16.

The papers have sometimes been cooperative efforts of individuals and organizations or individuals and companies--sometimes all three groups have made significant contributions. However, each study has been labeled with data processing or word processing. There appears to be a void in research encompassing the integrated field.

Extensive research reveals that the answers have not been found regarding what is needed by prospective employees to enter information systems analysis and information processing. This leaves academic and functional areas--information systems analysis and information processing--to be researched.

Statement of Problem

The problem of the study was to identify characteristics, skills, and knowledges needed for entry-level employment and advancement in the area of Information Processing.

Limitations

The population for the study was limited to companies listed in the "Statistical Abstract of Oklahoma 1980"[1] which were located in the Oklahoma City Metropolitan Area. All companies listed in the abstract employed 500 or more employees. A further limitation was imposed in the selection of the population--only companies which processed data within the local area of the Oklahoma City office were included in the study.

All personnel interviewed within the companies were employed in a managerial or supervisory capacity. All personnel interviewed

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[1]Neil J. Dikeman, Jr., assoc. dir., "Statistical Abstract of Oklahoma 1980," (University of Oklahoma: Center for Economic and Management Research, 1980).

had direct input into the hiring of entry-level employees within the companies.

Operational Definitions

Characteristic - Characteristic identifies a distinctive personal quality of an employee.

Data Processing - Data Processing covers the collecting, classifying, sorting, calculating, summarizing, and printing of facts and figures through the use of electronic technology for managerial decision-making.

Electronic Files - Electronic Files include the electronic storage and retrieval of records necessary for business operations. (Examples of business files are payroll files, inventory files, accounts receivable files, accounts payable files, and mailing lists.)

Entry-Level Personnel - Entry-Level Personnel are employees hired directly from educational delivery systems without work-related experience for the position.

General Knowledge - General Knowledge is the knowledge needed by entry-level employees not directly involving machine interface.

Knowledge - Knowledge is the experience and mental ability necessary to comprehend a particular area.

Information Processing - Information Processing involves methods, procedures, materials, equipment, and workers which transform raw data into information to be used as the basis for management decision-making.

Skill - Skill encompasses the ability to mentally and physically complete a given task.

Telecommunications - Telecommunications refer to transmission and receiving of information through telephone, telegraph, and/or microwave facilities.

Word Processing - Word Processing is used to include the origination, production, reproduction, storage and retrieval of written words through the use of electronic technology.

Research Design

The first step in the study was a comprehensive search of related literature.

The second step was the design and construction of an interview-questionnaire to collect the relevant data.

The third step was the presentation of the interview-questionnaire to the panel of experts.

The fourth step was the revision of the interview-questionnaire to include the suggestions made by the panel of experts.

The fifth step was the selection of the population which resulted in the choice of large companies in the Oklahoma City Metropolitan Area as listed in the "Statistical Abstract of Oklahoma 1980."[1]

The sixth step was to conduct a pilot study in which selected companies from the list of the population were chosen to validate the instrument.

The seventh step was the revision of the interview-questionnaire to include the suggestions obtained from the pilot study. The instrument was submitted to a professional printer for duplication. (An example of the final interview-questionnaire is located in Appendix A.)

The eighth step was collection of data through personal interviews.

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[1]Dikeman.

The ninth step was to code, keypunch, and verify keypunching of the data collected.

The tenth step was to tabulate and analyze the collected data utilizing statistical techniques described in Chapter III. The data were used with statistical programs, Condescriptive and Crosstabs, from the Statistical Package for the Social Sciences (SPSS).[1]

The final step in the study was to report the findings, analyses, and recommendations for further study.

Organization of the Study

Included in Chapter I of the formal report are the introduction, statement of problem, limitations, operational definitions, research design, and organization of the study.

A review of related literature is presented in Chapter II. The review includes formal research (present and past), published articles and books, personal conversations, telephone conversations, and abstracts from papers presented at national conventions of associations related to Information Processing.

The research design and the procedures followed in completing the study are described in Chapter III.

The results of the tabulation and analyses of data are illustrated in Chapter IV.

A review of the problem, the procedures used, a summary of the findings, and recommendations for further study based upon the research are incorporated into Chapter V.

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[1]Norman H. Nie, Hadlai Hull, Jean G. Jenkins, Karin Steinbrenner, and Dale H. Brent, Statistical Package for the Social Sciences, 2d ed. (New York: McGraw-Hill Book Company, 1975), pp. 185-202.

Summary

As explained in Chapter I, the procedures in the business office are changing, and technological change is necessary for survival according to many authorities.

Olney wrote, "The growing complexity of today's business organizations and the need to increase office efficiency while reducing office costs have resulted in changes in office procedures, equipment and personnel."[1]

Fronk, a senior consultant with Arthur D. Little, Inc., foresaw a crossover from a labor-intensified office to a machine-intensified office. Fronk added ". . . that while office workers' salaries are increasing at an annual rate of seven percent (constant dollars), the cost of communications equipment is dropping at an annual rate of 11 percent and the cost of computer memory by 40 percent."[2]

Included in Chapter I is a preliminary research of the literature illustrating a need for the study, statement of problem, limitations, operational definitions, research design, and organization of the study.

Further, this descriptive research study has identified the characteristics, skills, and knowledges needed by entry-level personnel in the office utilizing the new technologies.

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[1]Robert J. Olney, "A Study to Determine Entry-Level Characteristics of Prospective Employees for Business Office Positions which Utilize Components of Systems Planning and Controlling" (Ph.D. dissertation, University of Oklahoma, 1980), p. 15.

[2]Michael Thoryn, "Tomorrow's Office: Wired for Words," Nation's Business 68 (July 1980):56.

CHAPTER II

SELECTED RELATED LITERATURE REVIEW

Introduction

It has become a standard practice to include a "review of literature" in every dissertation. Selltiz stated the reason for this viewpoint succinctly, "The fact that this has become almost a routine requirement may blind us to its great potential value . . . . The accumulation of . . . knowledge is a slow, gradual process, in which, on the whole, one group of investigators build on the work of others and, in turn, contribute their bit or bits . . . ."[1]

Bednar further explained values which should be derived from a review of the literature: "(1) To explain the theoretical base for the research and (2) to set the current research into perspective to show the 'state of the art.'"[2]

Following these viewpoints, this investigator made an exhaustive study of the possible resources. Items were found and reviewed to give relevancy to this study.

The indices utilized included Current Index to Journals in Education (CIJE), Educational Resources Information Center (ERIC),

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[1]Claire Selltiz, Lawrence S. Wrightsman, and Stuart W. Cook, Research Methods in Social Relations, 3d ed. (New York: Holt, Rinehart, and Winston, 1976), p. 57.

[2]Anita Sparks Bednar, "The Relationship Between Job Satisfaction and Life Satisfaction Among Faculty in Selected Oklahoma Junior Colleges" (Ph.D. dissertation, University of Oklahoma, 1980), p. 12.

Business Periodicals Index, Business Education Index, and dissertation catalogs from University Microfilms International.

Many articles have been published expounding the necessity of integrating all the technologies needed to process information, but no formal research was found which attempted to incorporate data processing and word processing. The research reports which existed seldom mentioned electronic files or the newest technology--telecommunications.

To provide clarity for readers, the review of research and literature pertaining to the five major categories (Characteristics, Data Processing, Electronic Files, Telecommunications, and Word Processing) was presented in the same order as had been printed on the interview-questionnaire.

Characteristics

Technology can be viewed as an open system. Man thinks, man invents, man's inventions affect man, man reanalyzes himself, man changes, man's thinking process now issues from a broader base and the circle continues. For each technical invention of man which is utilized, a requirement is mandated--a more knowledgeable worker to interface with the new technology. Technology frees man, not only from laborious tasks, but from geographic locations. This freedom carries with it the implication of career changes for the worker.

O'Neil and Nelson proposed, "To permit freedom of career changes with a minimum of readjustment and retraining between occupations, individuals need more than just very specific job skills."[1]

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[1]Sharon Lund O'Neil and Robert E. Nelson, "Workers View Occupational Survival as a Combination of 'Skills,'" Delta Pi Epsilon Journal 20 (January 1978):13.

Five hundred occupational survival skill items were identified by the Illinois Division of Adult, Vocational and Technical Education under the direction of Nelson. After a literature review and extensive telephone interviews in the State of Illinois, the list was reduced to twenty-seven. Of the twenty-seven, seventeen appeared to be important for occupational survival regardless of occupational classification. The skills are delineated as follows:[1]

To be dependable
To get along with people with a variety of personalities
To work as a team member
To understand written information
To have basic writing skills
To maintain good health
To know your own abilities, strengths and weaknesses
To give an honest day's work
To be loyal to the organization for which you work
To make independent decisions
To use initiative and imagination
To know what is expected of you
To locate information, materials, or equipment
To work without close supervision
To work under tension or pressure
To adjust to various work situations
To manage time and materials efficiently

Vanhuss, in writing for the National Business Education Yearbook, asserted:

> Emphasis on office productivity and work measurement will continue to increase. The business education program must provide opportunities for students to develop an understanding of productivity and work measurement concepts. Even more important, students must be prepared to work in an office environment in which rigid quantitative and qualitative work standards are used. Rigid standards can create tremendous amounts of pressure, and students need to learn to work under such pressure.[2]

Vanhuss professed that of all the competencies needed for success in today's office, communication skills is at the top of the

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[1]Ibid., pp. 17-18.

[2]Susie H. Vanhuss, "Impact of Technology on Communications and Interpersonal Relationships," Updating Content in Secondary Business Education, in National Business Education Yearbook, no. 19 (Reston, Virginia: National Business Education Association, 1981), p. 23.

list.[1] Executives complain of their employees being deficient in spelling, punctuation, word usage and vocabulary.[2] However, Vanhuss would go considerably beyond written communication in enumerating skills needed by office employees:

> Although written communications are important, written communications constitute only a small portion of the total communications process. Rough estimates indicate that of the time spent communicating, approximately 45 percent is spent listening, 30 percent is spent speaking, 16 percent is spent reading and 9 percent is spent writing. The business education curriculum must provide opportunities for students to develop competencies in listening, speaking, reading and writing as well as opportunities to develop sensitivity in nonverbal communications.[3]

Burford completed a study in 1979, "Developing Trends in Office Technology and Career Paths as Related to the Office of the Future." Burford's study "sought to determine how features of the office of the future as perceived by administrative, supervisory, and clerical persons are related to career paths of office workers."[4]

The research was limited to the extent the sample was representative of office workers employed by sixteen insurance companies in the Columbus, Ohio, metropolitan area. Interviews were conducted with administrative, supervisory, and clerical personnel in each company.

Burford found, "Items listed as personal traits were considered more important for purposes of advancement than knowledges and skill items."[5]

Forty-three knowledges and personal traits were isolated in the study and rated as to their importance in 1978 and a projection made

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[1]Ibid., p. 21. [2]Ibid., p. 14. [3]Ibid., p. 22.

[4]Anna Marie Burford, "Developing Trends in Office Technology and Career Paths as Related to the Office of the Future," Delta Pi Epsilon Journal 23 (January 1981):19.

[5]Ibid., p. 28.

as to their importance in 1981. For advancement, administrators rated the following as becoming more important in 1981 than the characteristics had been in 1978: decision-making ability, flexibility, self-confidence, honesty, problem-solving ability, and initiative.

For advancement, supervisors considered the following traits to become more important: honesty, flexibility, and desire for self-improvement. For advancement, the clerical group considered the following traits to become more important: honesty, self-confidence, management of time, flexibility, and desire for self-improvement.

Burford highlighted some concepts and personal traits needed for entry-level word processing jobs and advancement in an article written in 1980 based on the survey of office supervisory personnel. The following items were included by Burford: concepts in office technology, understanding acronyms and new word processing terms, oral and written communications, decision-making skills, commitment to life-long learning, flexibility, and premium on neat and accurate work.[1]

Tuma conducted a study in 1980, "Identification of Word Processing Competencies in the Midland Area Offices, Midland, Michigan." The problem of the study was to ". . . identify the competencies needed for entry-level positions in word processing in Midland, Michigan."[2]

Tuma found the ability to work under pressure, manage time, set priorities, comprehend word processing concepts, proficiency in oral and

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[1]Anna M. Burford, "Keyboarding: An Important Skill for the Office of the Future," Journal of Business Education 55 (April 1980):292.

[2]Patricia R. Tuma, "Identification of Word Processing Competencies in the Midland Area Offices" (Master's thesis, Central Michigan University, 1980), p. 27.

written communications, ability to make decisions, desire to improve, and mechanical comprehension to be very important characteristics for entry-level employment and advancement in word processing.[1]

Ivarie wrote, "Employers are interested as ever in people who are loyal, honest, punctual, reliable, industrious, cost-conscious, and pleasant."[2] Ivarie agreed with Vanhuss, Burford, and Tuma that communication skills, written and oral, are important.

Existing literature leads one to believe that old values such as honesty, fairness in giving a full day's work, etc., are just as important in 1981 as in the history of the country. However, a new element has been injected into the environment of the workers' domain, and the new element concerns itself with considering the needs of workers at the same time the needs of the company are being analyzed.

Vunderink cautioned:

> The preparation of youth for successful work adjustment requires not only adequate development of necessary skills and knowledges needed in the office of today, but also the analysis of a system of work values which will have the best chance of achieving correspondence with the conditions inherent in the office work environment. It seems also, that successful work adjustment must include an awareness of the interface that exists between the values and needs of the workers and the characteristics of the work environment.[3]

The purpose of Vunderink's study was to gain information about the work behaviors of urban business education students and clerical office workers and about the nature of the clerical office work

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[1]Ibid., p. 32.

[2]Theodore W. Ivarie, "Curricular Concerns About the Changing Office," Business Education Forum 35 (November 1980):18.

[3]Patricia Vunderink, "Identification and Comparison of Work Values and Job Perceptions of Urban Business Education Students and Clerical Office Workers," Delta Pi Epsilon Journal 22 (October 1980):22.

environment. Results were obtained from 257 students enrolled in office occupation capstone courses in 13 central city high schools and from 226 clerical workers holding positions for more than 2 years in 12 firms within the same central city area.[1]

Data Processing

Secondary

King specified:

> A relevant secondary education curriculum is needed to reflect the rapidly changing computer technology and its impact on society. Such a curriculum can be achieved only through the articulation, at all educational levels, of common computer education goals: (1) computer literacy and (2) career preparation in information/data/word/computer processing.
>
> The beginning steps in a computer education program are the responsibility of secondary business educators.[2]

King stressed that secondary schools should provide the knowledges and skills needed for students to obtain computer literacy for entry-level jobs as data entry and computer operators. The secondary schools should require a minimum of 40 words per minute in typewriting with appropriate ten-key machine skills for entry-level keyboard positions in data preparation and data entry.[3]

King's main requirement for teachers would be to teach students flexibility to adapt to changing technology and enable students to understand the capabilities and limitations of computer technology. Two courses should be offered at the secondary level. The first course would be for all students and would enable the pupils to learn a simple programming language such as BASIC or Pascal along with elementary

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[1]Ibid., p. 21.

[2]Margaret King, "A Program for Computer Education," The Balance Sheet 63 (September 1980):31.

[3]Ibid., pp. 32-34.

programming concepts. The second course would be for those students interested in exploring a career in any aspect of computer technology. The second course would teach advanced programming techniques for business application programs with BASIC, Pascal, COBOL, or RPG.[1]

Miller remarked that "development of data-entry vocational skills is generally being accomplished adequately."[2]

However, Miller qualifies the statement by adding:

> . . . demand for computer operators and other entry-level positions, such as control clerks and input/output coordinators has often been ignored. The cost of equipment has occasionally been a factor here but sometimes other career paths have been slighted to teach programming since it is more prestigious."[3]

Cicero, assistant data processing officer with Quachita National Bank in Monroe, Louisiana, described the skills needed for entry-level employment in data processing by high school graduates. Cicero maintained, "A strong foundation in typewriting skills will prove to be a significant advantage . . . ."[4]

Cicero further observed:

> Basic finger dexterity helps out tremendously. Employers also look for basic clerical skills and skills in bookkeeping, filing, business mathematics, and basic business. Basic checking skills such as proofreading, verification of totals, and techniques used in checking should be developed . . . . Due to the fact that most input machines have features related to the ten-key adding machine, this skill would be of value.[5]

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[1]Ibid.

[2]Georgia B. Miller, "Data Processing in Teacher Education Program: Fact or Fantasy?" Business Education Forum 35 (March 1981):33.

[3]Ibid.

[4]John J. Cicero, Jr., "Data Processing: Basic Concepts and Skills," The Balance Sheet 62 (February 1981):204.

[5]Ibid.

Mundrake itemized entry-level jobs in data processing for which high school graduates could qualify with the appropriate well-developed skills in keyboarding, proofreading, and text-editing. The list included data-entry or peripheral equipment operators, computer operations personnel, tape librarians, and application programmer trainees.[1]

It is stated in the Occupational Outlook Handbook that keypunch and auxiliary personnel need a high school education. Additional requirements included for the entry-level jobs are keyboarding speed and accuracy, ability to work as a team member, and the capability to work under close supervision.[2]

Johnson's study, "Job Specifications for the Computer Production Operations and Skill-Related Data Processing Job Cluster," has been summarized in several publications: Delta Pi Epsilon Journal, Vol. 20, January, 1978; The Changing Office Environment, National Business Education Yearbook, No. 18, 1980; Business Education Forum, Vol. 35, December, 1980; and The Balance Sheet, Vol. 62, March, 1981.

> The problem of the study was to determine the educational qualifications, operational task distinctions, and career ladder or promotional opportunities in computer and skill-related jobs in the computer production operations job cluster of the electronic data processing industry. The study pertained only to computer operation and skill-related positions in the data processing job cluster for which full-time data processing experience and/or a college degree are seldom required.[3]

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[1]George A. Mundrake, "Data Processing: A Challenge for the 80's," The Balance Sheet 62 (February 1981):98.

[2]U.S. Department of Labor, Occupational Outlook Handbook, 1980-81 Edition, p. 97.

[3]Mildred Fitzgerald Johnson, "Job Specifications for the Computer Production Operations and Skill-Related Data Processing Job Cluster" (Ed.D. dissertation, Temple University, Philadelphia, Penn., 1976), pp. 8-14.

The population consisted of members of the Data Processing Management Association located within the Philadelphia Metropolitan area. Three questionnaires were utilized. The first was an exploratory which received responses from 242 computer operations managers. A subset of 12 firms was randomly selected to receive the "worker questionnaire" and "worker-traits inventory."[1]

Johnson found that "education, on-the-job training and prior work experience requirements for the entry-level job cluster do not differ significantly for data-entry, data control, or console operation trainee positions . . . ."[2]

Johnson reported that the following skills were needed by entry-level personnel: "Students possessing fundamental knowledges of processing data, a minimum typing speed of 40 w.p.m., and facility with a 10-key calculator would be qualified for any of the eleven or more jobs as keyboard specialists or clerk analysts in skill-related data-processing jobs."[3]

Johnson's study showed the eleven skill-related jobs: (1) Console Operator Trainee (2) Tape/Disk Librarian (3) Input/Output Clerk (4) Data-Entry Operator (5) Data Control Clerk (6) Distribution Clerk (7) Coding Clerk (8) MICR Encoder (9) MICR Reader Sorter Operator (10) Add-Punch Operator (11) Proof Clerk.[4]

Using the job requirements Johnson identified as a basis, Lambrecht summarized the competencies needed for entry-level personnel

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[1]Ibid., pp. 81-105. [2]Ibid., p. 152.

[3]Mildred F. Johnson, "Needed: Articulation Model for Data Processing," The Balance Sheet 62 (March 1981):252.

[4]Johnson, "Job Specifications for the Computer Production Operations," p. 151.

in the field of data processing in occupations not requiring a postsecondary degree.[1]

According to Lambrecht, the competencies and trait requirements held in common by each of the three entry-level data processing occupations, computer console trainee, data control clerk, and data-entry clerk, are:[2]

1. Skill in operating a 10-key adding machine and possibly the typewriter
2. Familiarity with clerical routines and filing procedures
3. Familiarity with basic data processing concepts and terminology
4. Basic arithmetic skills that will permit comparing control totals, maintaining work logs, and interpreting numerical information such as data field lengths and formats
5. Sensitivity to the importance of accurate work and ability to check carefully for discrepancies in jobs processed or incompleteness of data
6. Care in handling source documents, punched cards, or magnetic media
7. Willingness to work in circumstances requiring time-critical assignments
8. Possessing a preference for activities dealing with machines, techniques, and processes which involve routine, concrete, organized procedures
9. Ability and willingness to take and follow written and oral job instructions

Data-entry operators using either keypunch/key-verifiers, stand-alone buffered data-entry devices, or computer-assisted data-entry devices need the following additional competencies or traits:[3]

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[1]Judith J. Lambrecht, "Special Competency Requirements Section A: Data Processing Personnel," The Changing Office Environment in National Business Education Yearbook, no. 18 (Reston, Virginia: National Business Education Association, 1980), p. 168.

[2]Ibid. [3]Ibid.

1. Ability to typewrite at a minimum of 40 wpm

2. Skill in keypunch/key-verified operations and preferably buffered stand-alone data-entry device operation (tape cassette, diskette, and buffered dual-function card machines)

3. Sufficient keystroking skill to meet production requirements of approximately 8,000 keystrokes an hour on unbuffered machines to 10,000 keystrokes an hour on a buffered machine. Error ratios of 1 percent to 2.5 percent must be maintained on this work. Trainees may be expected to attain 75 percent efficiency within three months

4. Special awareness of the importance of accurate work

5. Willingness to perform continuous machine operations requiring sitting for long periods of time

6. Willingness to accept a production environment with tension, time pressure, and monotony

Computer console operators need the following additional competencies or traits:[1]

1. General preparation in clerical operations and data processing, also possibly accounting

2. Knowledge or familiarity with electronic and mechanical business data processing equipment

3. Motor coordination and digital dexterity necessary to manipulate equipment

4. Willingness and ability to learn rapidly the intricate operation and control of a computer system, such as the computer console, punched card, magnetic tape, direct access I/O devices, and high speed printers

Head, Program Director, Business and Office Education Unit, Division of Vocational Department of Education, State of Florida, initiated a study which is currently in its fourth year.[2] The study was planned to identify concepts needed by data processing entry-level workers in business and industry located in the State of Florida.

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[1]Ibid.

[2]Telephone conversations and written correspondence with Charles Head, Program Director, Business and Office Education Unit, Division of Vocational Department of Education, State of Florida, May, June 1981.

Florida's State Department of Education decreed in 1975 that vocational education should be competency based by subject and level of difficulty.

A "writing team" was appointed by the Business and Office Education Unit, Division of Education, State of Florida, which consisted of high school, community college, and university teachers. The team listed competencies believed to be needed in a study of data processing for business.

The operating procedures for the "writing team" included the following procedures: After each level was completed by the "writing team," the list was sent to several companies in Florida for validation. The companies were to ascertain if the responses were in agreement with the "writing team" as to concepts needed by entry-level personnel in the area of data processing. Level I competencies were to enumerate the minimum skills needed by all students in business education--the core elements for fundamentals. Level I was envisioned to be taught at all high school grade levels--9 through 12. Level II competencies were to identify, reinforce, and expand on competencies in Level I and were to be offered in Grades 10 through 12. Level III was a further refinement and application of Level II competencies and to be offered in Grades 10 through 12. Level IV will pertain to postsecondary education.

The first two levels were published in January of 1980, the third level is scheduled for publication in the fall of 1981, and the fourth level is presently being sent to selected companies within the State of Florida for validation. Figures 1, 2, and 3 list the competencies the Vocational Educational Department and the participating companies considered necessary for Levels I, II, and III. The competencies are recommended by the State Department to be taught in all secondary schools in the State of Florida.

FIGURE I

LEVEL I TASKS

(Minimum Skills for All Students in Business Education--Grades 9-12)

1. Identify applications of basic data, punched card, and magnetic storage processing terms
2. Identify definitions of basic data, printed card, and magnetic storage processing terms
3. Identify hardware and software as first, second, third, or fourth generation
4. Identify the advantages of each generation of hardware and software over the preceding generation
5. Identify the components on an 80-column card including characteristics and positions
6. Locate requested information on a completed punched card
7. Identify the difference between punched card and magnetic recording equipment
8. Identify the relationship between a source document and a single transaction on a unit of record (Such as punched card or magnetic tape)
9. Identify terms used with punched card and magnetic recording equipment functions
10. Identify computer hardware and software
11. Identify the major programming languages used in business data processing
12. Manually correct errors on a computer printout
13. Verify the totals on the printout as in-balance or out-of-balance
14. Locate requested information on a computer printout
15. Identify major types of careers in data processing with the duties performed and educational requirements needed
16. Identify applications of computers in modern business

SOURCE: Charles Head, Core Elements for Fundamentals (Tallahassee, Florida: Department of Education, January 1980), pp. DP-1, DP-2.

FIGURE 2

LEVEL II TASKS

(Reinforcement and Expansion of Competencies--
Grades 10-12)

1. Sequence and define the six steps of a processing cycle
2. Classify accounting functions that are commonly computerized
3. Classify characteristics of the three types of media used as input to a computerized accounting system
4. Classify computer devices found within an automated accounting application
5. Define the five major categories of information required in a computerized payroll system
6. Classify fields found within an employee record of a computerized payroll system
7. List fields found in major reports generated as output in a computerized payroll system.
8. Define six major categories of information required in a computerized accounts payable system
9. Classify items required on a purchase requisition
10. List fields found in major reports generated as output in a computerized accounts payable system
11. Define three major categories of information required in a computerized accounts receivable system
12. Classify characteristics of recording transactions as on-line points of sale or manual methods
13. List fields found in major reports generated as output in a computerized accounts receivable system
14. Identify symbols used in an accounting flowchart application
15. Classify flowchart symbols used in an accounting application as input, output, processing, or input/output
16. Interpret a payroll flowchart
17. Interpret an accounts payable flowchart
18. Interpret an accounts receivable flowchart

FIGURE 2 (Continued)

19. Calculate batch totals for computer processing
20. Balance a cash requirements report
21. Balance an invoice register report
22. Balance a distribution summary report
23. Balance a transaction register
24. Balance a payroll register
25. Locate and manually correct all incorrect entries on a weekly payroll audit report

SOURCE: Charles Head, Core Elements for Fundamentals (Tallahassee, Florida: Department of Education, January 1980), pp. 75-76.

FIGURE 3

LEVEL III TASKS

(Refinement and Application--Grades 10-12)

1. Operate a card punch without program control
2. Operate a card punch utilizing single program format in program mode
3. Operate a key to disk utilizing a single program format in program mode
4. Type numeric data at a minimum speed of 8,000 strokes per hour
5. Place maintenance call to equipment vendor
6. Log and scratch expired tapes in library
7. Locate tapes in tape library
8. Cut down and reapply load point marker on tape reel
9. Follow procedures for tape read/write error handling
10. Operate computer card reader or read/punch unit
11. Operate computer operator console
12. Operate off-line computer equipment (decollator and booster)

FIGURE 3 (Continued)

13. Mount and load magnetic tape drive
14. Mount and load computer disk drive
15. Operate an on-line terminal
16. Operate a line printer
17. Change forms on line printer
18. Perform card-to-print copy on computer system
19. Perform device-to-device copy on magnetic media computer devices
20. Perform program compilation
21. Perform preventative maintenance on magnetic tape unit
22. Prepare JCL cards for job execution
23. Complete operator log of processed jobs
24. Identify characteristics of COBOL programs
25. Code a COBOL program to solve a business application
26. Interpret operator flowchart of simulated business job
27. Construct operations flowchart from job specifications
28. Construct a program flowchart
29. Identify characteristics of various operating systems
30. Identify characteristics of current memory media
31. Prepare a schedule for job re-run
32. Identify characteristics of computer communications
33. Check printout for error, correct and re-submit
34. Compute due-in and due-out dates for controlled reports
35. Prepare a data services form
36. Identify program and systems flowchart symbols

SOURCE: Charles Head, unpublished materials for Department of Education, Tallahassee, Florida.

Postsecondary

DeMarco stated in his textbook:

> In the past, the business areas being automated were the simpler ones, and the users were rather unsophisticated; it was more realistic to train computer people to understand the application than to train users to understand EDP technology. As we come to automate more and more complex areas, and as our users (as a result of prevalent computer training at the high school and college level) come to be more literate in automation technologies, this trend is reversing.[1]

Mundrake elaborates on the subject of changing needs for data processing professionals and maintains that "Increasingly, programmers, systems programmers, and systems analysts are expected to obtain a post-secondary degree in a computer application area such as accounting, finance or management."[2]

Mundrake proclaimed, "Lifelong education is a must for a person to gain, maintain, or advance in a data processing career."[3]

The Occupational Outlook Handbook reinforced DeMarco and Mundrake's statements concerning requirements for programmers and systems analysts. For both professions, business courses are listed as requisites. The usual qualifications sought by business for programmers are:[4] college graduates; courses in data processing, accounting, and business administration; logical reasoning; analytical ability; patience; persistence; accurate under pressure; possess ingenuity and imagination.

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[1]Tom DeMarco, Structured Analysis and System Specification (New York: Yourdon, Inc., 1979), p. 5.

[2]Mundrake, p. 197. [3]Ibid.

[4]U. S. Department of Labor, Occuptional Outlook Handbook, 1980-81 Edition, pp. 96-101.

According to the Occupational Outlook Handbook, the usual qualifications sought by business for system analysts are:[1] college education in computer science, information science, information systems, or data processing; courses in accounting, business management and economics; familiarity with programming languages; logical reasoning; concentration; like working with ideas; close attention to detail; communication skills; and prior work experience.

Due to changes in the data processing environment, the Data Processing Management Association (DPMA)[2] is currently developing a model business data processing curriculum utilizing the expertise of individuals from education and business. The proposed curriculum will prepare the participants as programmer/analysts.

If the DPMA is able to adhere to scheduled dates, publications will be forthcoming in the fall of 1981. Information for each recommended course will include the following:[3]

Course description
Course preprequisites
Course objectives
Detailed topic outlines with skill and time percentages
A discussion on the programs or projects to be completed
Course approach
References to educational materials to include textbooks, cases, and audio-visual materials

Several items have already been determined from various committee conferences of DPMA. Figure 4 lists the findings to date.

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[1]Ibid.

[2]Personal interview with working committee members on the Model Curriculum Development Project sponsored by the Data Processing Management Association in Oklahoma City, May, 1981.

[3]Ibid.

FIGURE 4

FINDINGS FROM REGIONAL CONFERENCES
THAT HAVE BEEN ESSENTIALLY DETERMINED

Computer Information Systems (CIS) is the most appropriate name for this type of curriculum
Computer Information Systems (CIS) is a separate discipline from Computer Science
Application Programmer/Analysts is the target market
There should be a total of ten CIS courses. Seven courses which are CIS core and three CIS elective courses
That the business support courses are an essential part of this degree program
Lower division CIS courses are to be taught the same whether taught at the community college or the university
COBOL is primary high-level language and is to be used in CIS-2 and CIS-3
In CIS-6 the language used has to depend on the host language available with the database management system
There is a commitment to Structured System Techniques in CIS-4 and CIS-5. A generic approach is recommended. Further, case studies are to be used in both courses
In CIS-1, the language choice is to be left open
Database Management Systems CIS-11, Information Resource Management CIS-8, Systems Planning CIS-9, Distributed Data Processing CIS-10, EDP Auditing CIS-12, and Decision Support Systems CIS-14 were considered most important and will be established as CIS electives

SOURCE: Personal Interview with working committee members on the Model Curriculum Development Project sponsored by The Data Processing Management Association in Oklahoma City, May, 1981.

Interesting data were collected and analyzed in 1980 by J. Wayne Spence, Jarrell C. Grout, and John W. Anderson through a study funded by Stephen F. Austin University. The goal was to assess the computing knowledge needs of business school graduates and to determine if a

difference exists "in perception between the academic and business communities vis-a-vis computing knowledge requirements."[1]

Only small discrepancies were found between business and academic responses with respect to the ten most important and the ten least important topics. Within the top ten topics, the only difference was on input/output layouts which was ranked tenth by businessmen and nineteenth by the academicians. The authors remarked, "The business group may be voicing a concern for the proper recording of data by users."[2] The only major difference in the ten least important topics was over history of computing. The academic group tended to rate this topic higher than did the businessmen in addressing the needs of the business world. Table 1 includes the responses of both groups.

A survey was conducted by the staff of the Business World Women magazine which included interviews with recruiters and data processing professionals. Many characteristics upon which the recruiters and data processing professionals agreed were also consistent with characteristics given in the Occupational Outlook Handbook, ". . . mathematical skills, a logical mind, ability to concentrate, patience, and endurance."[3]

The recruiters and data processing professionals also added an imaginative approach to problem solving; good communication skills, both oral and written; and problem solving ability. Ability to program in

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[1]J. Wayne Spence, Jarrell C. Grout, and John W. Anderson, "What University Business School Graduates Should Know About Computers, A Comparative Study," Data Management 19 (February 1981):25.

[2]Ibid., pp. 27-28.

[3]"Data Processing Careers," Business World Women 12 (Spring 1979):10.

TABLE 1

RANKED COMPUTER KNOWLEDGE TOPICS

Topic	Business Rank	Academic Rank
Computer terminology	1	1
Systems analysis and design	2	6
COBOL	3	3
Examples of business applications	4	2
Use of software packages	5	5
Types of input-output devices	6	4
Online Systems	7	10
Database management systems	8	12
System flowcharts	9	11
Input-output layouts	10	19
Program flowcharts	11	15
Comparative computer systems	12	17
Structured design	13	24
Telecommunications	14	26
Numbering systems	15	35
FORTRAN	16	7
File organizations	17	9
Selection of software packages	18	13
JCL (Job Control Language)	19	31
Internal characteristics of computers	20	16
BASIC	21	8
Types of internal memory	22	18
Coding structures	23	28
PL/1	24	21
Large-scale computer systems	25	34
File sorting	26	25
Examples of scientific applications	27	33
Minicomputer systems	28	20
Characteristics of I/O devices	29	23
Management of computers	30	22
Batch systems	31	14
Algorithm development	32	19
Hardware selection	33	27
Assembler	34	40
RPG or RPGII	35	37
History of computing	36	27
Microcomputing systems	37	38
System security	38	32
Other operation and use topics	39	44
Other languages	40	36
Characteristics of internal memory	41	41
Other general knowledge topics	42	42
Other applications and systems topics	43	43
Other equipment topics	44	44

SOURCE: J. Wayne Spence, Jarrell C. Grout, and John W. Anderson, "What University Business School Graduates Should Know About Computers, A Comparative Study," Data Management 19 (February 1981):25.

COBOL was a valued qualification along with practical experience in computer languages. Adjectives such as outgoing, self-motivated, responsible, ambitious, creative, imaginative, talented, risk taking, patient, and persistent were used by the participants to describe the ideal employee.[1]

Another survey had been taken a year and one-half earlier concerning the same subject. Statements from corporate recruiters were consolidated into an article for Business World Women highlighting qualities for success in data processing.[2]

Garvey of Pitney-Bowes suggested, "Students should be careful in gearing their careers toward the right curriculum because industry looks for business-oriented students."[3] Garvey further recommended courses in accounting because jobs in industry require a background knowledge in accounts receivable, accounts payable, payroll, sales forecasting, quotas, marketing systems, etc.

Numerical ability is necessary and an appreciation of detail and accuracy, but pervasive throughout all of the corporate recruiters' statements is the word "persistent." The recruiters commented, a person must be able to see a job through to completion dealing with frustration along the way.

Meddaugh, of the National Security Agency, expounded on the subject of persistence and implied that an inventive and stubborn person who doesn't know the meaning of the word "can't" will succeed.[4]

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[1]Ibid., p. 30.

[2]"Career of the Future: Data Processing," Business World Women 11 (Fall 1977):12.

[3]Ibid. [4]Ibid., p. 28.

White added:

> It is a fast moving industry and people must be willing to learn constantly by taking courses to keep up to date every few years. Teamwork is very important because new ideas are shared by other people to enhance the learning process. Those who show that little extra in enthusiasm and aggression succeed in this business.[1]

In a survey of data processing managers, Stair and Render found data processing professionals to believe that an understanding of applications software, management information systems, systems analysis and design, and knowledge of the organization and operation of the data processing department are the most important areas of knowledge for college business students.[2]

Scannell,[3] using the New York Consumer Protections Board's Researcher's Guide, suggested that a community college's minimum core curriculum should contain an introductory session covering terminology, number systems, flow charts and operating systems; two semesters of COBOL; two semesters of Assembler language; a course in project management, operating systems, data base or systems design; and related courses in business, accounting, and math. This should allow one to enter the field as a programmer or technical machine operator.

Drun, in writing for the National Business Education Yearbook, indicated all business students need an introductory data processing course. Drun reported that the following topics should be included:[4]

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[1]Ibid.

[2]Ralph M. Stair and Barry Render, "A Second Look at the Introductory Course in Business Data Processing," Business Education Forum 32 (May 1978):18.

[3]Tim Scannell, "Report Condemns N.Y. DP Vocational Training," Computer World 14 (January 1980):16.

[4]William O. Drun, "Data Processing," The Changing Office Environment in National Business Education Yearbook, no. 18 (Reston, Virginia: National Business Education Association, 1980), pp. 53-54.

Data processing--past, present, and future
The punched card--terminology, layout, and uses
Preparing input media for automated processing--types, techniques used, and study of different codes
Understanding electronic computers--input and output devices, central processing unit, and internal and external storage
Problem solving with the computer--flowcharting, writing programs in BASIC
Use of terminals--how to log on and off, how to use existing programs, how to create and modify files, use of monitor commands, use of text editor, and use of utility programs

Drun recommended COBOL be taught if possible with the following concepts:[1]

Introduction to structured programming and design
Programming input and output operations
Addition, subtraction, and report editing
Multiplication, divisfon, and use of COMPUTE statements
Comparing and final totals
Control breaks
Multiple level control breaks
Table processing

Franklin found in her study, "Integration of Data Processing Concepts in the Secondary and Post-Secondary Vocational Programs in the State of Alabama," there was a consensus that "Data processing managers would like for employees to study typewriting, data entry, computer console operations, and introduction to data processing concepts at the secondary level."[2]

While at the postsecondary level, Franklin declared, "Programmer and system analysts, the managers felt, needed basic accounting, flow charting, programming--COBOL, profit and loss, . . . and business applications."[3] Franklin added to the list with decision tables, strategies, PERT, queing, probability and simulation."[4]

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[1]Ibid.

[2]Patricia Ann Franklin "Integration of Data Processing Concepts in the Secondary and Post-Secondary Vocational Programs in the State of Alabama" (Ph.D. dissertation, Ohio State University, 1978), p. 93.

[3]Ibid., p. 84. [4]Ibid.

The problem of Franklin's study "was to compare the business data processing instruction in the vocational programs at the secondary and post-secondary levels in Alabama with what businesses require of prospective data processing employees."[1]

The data processing managers of thirty business firms located in Montgomery were interviewed. Questionnaires were sent to thirty-seven secondary schools and seven postsecondary schools located in the four largest cities in Alabama. Results were obtained from nine department heads and six postsecondary schools.[2]

Silver and Berke are president and vice president, respectively, of Wolfe Computer Aptitude Testing, Inc. The company gives strong arguments for incorporating a testing program into the hiring practices associated with programmers and systems analysts.[3]

Silver and Berke recommend the following traits be tested when hiring programmers:[4]

Logical ability
Interpretation of specifications
Documentation
Sustained concentration
Ability to follow instructions
Extremely high accuracy
Relatively quick working pace
High attention to detail

For systems analyst or programmer-analyst, Silver and Berke designated the following traits be tested:[5]

Ability to plan logical procedures for multi-step work flow
Ability to interpret intricate specifications
Alertness to finding alternate ways of proceeding

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[1]Ibid., p. 3. [2]Ibid., p. 96.

[3]Stephen D. Silver and Stephen Berke, "Testing Gets High Marks for Evaluating DP Job Candidates," Data Management 19 (April 1981):10-13.

[4]Ibid. [5]Ibid.

Documentation of each step
Relative effectiveness and efficiency of design
Quality of system design organization
Understanding of organization interrelationships
Ability to develop systematic procedures

Silver and Berke claim these traits can be tested before the applicant is employed. Not only does testing result in better qualified employees, but it reduces the rate of turnover. If the applicants have been tested, supervisors tend to give them higher ratings which lead to a more satisfied employee. When a superior programmer is not recognized by his organization, he will relocate.

Miller reflected on the personnel problem:

> Data processing is a function that has meaning only in the context of handling information for business needs. Data processing is the processing of information concerning the business. An understanding of the business functions is necessary to provide adequate interaction and service to users of information, a primary objective of office systems. . . . most data processing personnel do not hold this view. They look at their production as an end product not as a service to provide information to decision makers.[1]

Miller viewed this as a fault of business education:

> Office specialities are the activities that support the production function of the firm, creating or capturing, maintaining, retrieving, communicating, and disposing of information. Data processing is part of this total information. . . . business education has not provided the leadership and development for teachers of data processing at the high school level.[2]

Miller concluded:

> Either we are willing to accept the challenge of change in our profession, or we maintain our traditional stance and face the inevitable evolution of being absorbed by other disciplines. For example, the Association for Computing Machinery (ACM) has started a Special Interest Group in Office Automation. The American Federation of Information Processing Societies (AFIPS), representing eight associations, sponsors the National Computer Conference/ Office Automation Conference with thousands attending annually. The Data Processing Management Association (DPMA) is currently developing a model business data processing curriculum for presentation in 1981. But what are we business educators doing?[3]

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[1]Miller, p. 33. [2]Ibid. [3]Ibid., 34.

Electronic Files

Mundrake explained that most data processing involves the use of data files--data processing involves the creating and changing of the files, therefore, "Skill and conceptual knowledge for building and editing data files is essential even for data-entry employees."[1]

To illustrate the importance of files to business, COBOL (Common Business Oriented Language) was developed to utilize files. Spencer wrote, "COBOL is a language that enables users to: (1) describe files, (2) sort files, (3) update files, (4) obtain reports from files, and (5) make calculations using various numeric values found in its files."[2]

Moody insisted that a competency which needs to be developed by business for word processing personnel was to "organize and maintain a filing system for stored or recorded data."[3]

Moody completed a study in 1978 which was to identify the competencies needed by entry-level word processing administrative and correspondence secretaries as determined by secretaries, supervisors, and principals currently employed in word processing positions in South Carolina. The study also sought to provide data that would be helpful in determining the most appropriate source, educational institutions or business organizations, to be charged with the responsibility for teaching each competency. Twenty-five centers were selected from a population of forty centers in South Carolina.[4]

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[1]Mundrake, p. 198.

[2]Donald D. Spencer, Information Processing, 3d ed. (Columbus: Charles E. Merrill Publishing Co., 1981), p. 438.

[3]Patricia G. Moody, "Identification of Entry-Level Competencies and Focus of Training for Word Processing Secretaries in South Carolina" (Ph.D. dissertation, University of South Carolina, 1978), p. 64.

[4]Ibid., pp. 4-5.

The results of a national four-year study by Delta Pi Epsilon, with the support of the International Word Processing Association, (IWP)[1] was published in 1981. (Effective June 1, 1981, IWP will change its official name to International Information/Word Processing Association.)[2]

Using survey guides sent from the national office of Delta Pi Epsilon, the members interviewed employees selected from companies throughout the United States. The following groups of persons in each organization were interviewed: top/middle management decision makers, principals/originators, word processing supervisors/managers, word processing operators/correspondence secretaries, administrative support supervisors/managers, and administrative support secretaries.[3]

Competencies considered first in importance by 50 to 75 percent were organizing and maintaining a filing system for stored and recorded data.[4] Over one-half of the respondents listed, among the job duties, that word processing employees were responsible for maintaining and updating programmed stored data.[5]

When a person speaks of data processing, the person is speaking about file manipulation. Dock and Essick noted, "Data processing systems are used to collect, manipulate, and store data for reporting and analyzing business activities and events. Data is organized into files to achieve these purposes."[6]

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[1]Jolene D. Scriven, Chairperson, Summary Report of the National Study of Word Processing Installations in Selected Business Organizations (St. Peter, Minnesota: Delta Pi Epsilon, 1981), p. 1.

[2]Bette Primrose, "Integrated Information Systems: A Vital Need," The Office 93 (January 1981):159.

[3]Scriven, p. 3. [4]Ibid., p. 14. [5]Ibid., p. 12.

[6]Thomas Dock and Ed Essick, Principles of Business Data Processing, 3d ed. (Chicago: Science Research Associates, Inc., 1978), p. 10.

New techniques, new hardware, and new software are constantly being introduced into the market in an attempt to make electronic filing faster and more efficient. Problems in locating data stored on tapes, disks, or drums is gradually being conquered. One company reported:

> Electronic filing systems have required complex techniques for storing information as well as retrieving it. System Development Corp. (SDC) has eliminated the need for precise queries and filing rules. It has developed a powerful pattern-matching algorithm that searches every word in the files for a possible relationship to the query.[1]

If the machine works as reputed, it could save valuable training time for data-entry personnel in addition to not losing the information if perchance a document is filed incorrectly.

Lieber appraised the system of files that will be used in the 1980's:

> Because information needs of business will be far greater in the 1980's, an attempt to project configuration of filing requirements for a representative office can be hazardous. However, we can envision a mix with computerized tape storage, including storage available through minicomputers; information control systems that blend people-oriented hard file systems with speed and efficiency of computers; specialized systems accommodating media work stations, such as microfilm and microfiche storage, high-speed retrieval of fiche and creation of diazo copies for dissemination; filing or storage of repetitive type in memory of phototypesetting system, mobile storage systems for hard copy in arrangements that can save up to 70% of floorspace . . . .[2]

Information maintenance and jobs associated with it could receive deserved recognition in the echelon of jobs. We hope to see the end of the day when filing errors will be blamed on clerks.[3]

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[1]"Information Processing," Business Week, 26 November 1979, p. 94

[2]Paul Lieber, "Office Automation," The Office 91 (May 1980):158.

[3]Ibid.

Telecommunications

A recent article by Vanhuss explained what is meant by the term "Telecommunications."

> Telecommunications range from conventional telephone systems to the use of microwave bands and satellites for business communication. Document distribution, data distribution, and teleconferencing are key components of telecommunications. The movement toward a paperless society is based primarily on technology in telecommunications. Electronic mail has been around for many years but has only accounted for a minor share of the total mail. The integration of electronic mail into word processing and the technological advances in telecommunications seem to insure a substantial increase in the volume of mail transmitted electronically.[1]

Peacock further described the connection between word processing and communications:

> More and more, word processing systems communicate. Depending on manufacture and model, word processing key stations can be linked to compatible models, printers, processors, and various other automated equipment such as photocomposition systems, computer output microfilm units, optical character recognition scanners, and computerized dictation systems.
>
> The linkage can be direct wire or a dedicated telephone line if usage warrants. Or it might be via a Bell system dial-up telephone link, a common carrier network, or a value added computer service, many of which might use satellites. Of the 22 models of shared logic word processing systems on the market at midyear 1979, all have communications capability and four offer it as standard equipment.[2]

Smith wrote:

> Telecommunications will play a major part in the office of the future and it should be incorporated into your secretarial training program.
>
> Although telephone techniques remain basically the same, new features are being introduced into the office at an unbelievably fast pace. It is these new features and the new technology with which you and your students need to become familiar.[3]

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[1]Vanhuss, p. 19.

[2]James Peacock, "Information Processing and Tomorrow's Office," Fortune, 8 October 1980, p. 42.

[3]Dianna L. Smith, "Today's Telecommunications in Secretarial Programs," Business Education Forum 14 (February 1981):14.

International Data Corp. conducted a survey, using a random sample of eighty manufacturing companies from the Fortune 500 corporations, on office automation. Intensive in-depth interviews were conducted with executives at the headquarters of each company--thirteen face to face and fifty by telephone. Sixty-three of the companies responded.

More than three-fourths of the respondents plan to acquire electronic mail systems within the next three years and a big increase in teleconferencing utilization is anticipated.[1]

Bauman revealed how AT&T, the regulated communications giant, and IBM, the world's largest computer manufacturer, are now becoming direct competitors.

> Computer sciences and telecommunications have merged in a new technology--data communications. Data communications, the machine to machine transfer of information, usually at hyperspeed, is the major growth area for the computer and telephone industries.[2]

Nora and Minc presented telecommunications in a framework of world-wide usage giving business and industry access to what will culminate into instant information for decision-making personnel. "Previously separated means of communication are now converging together on data processing, creating a whole new range of services."[3]

According to Nora and Minc:

> The ease with which communications can be handled by satellite will accelerate the change in data processing. By increasing data transmissions and the exchange of processing operations . . .

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[1]Charles I. Norris, "Office Automation: Management Productivity Stressed in Survey," Computer Decisions 13 (April 1981):54.

[2]Ben M. Bauman, "Data Processing--A Look Ahead," Business Education Forum 35 (October 1980):26.

[3]Simon Nora and Alain Minc, The Computerization of Society (Cambridge: The MIT Press, 1980), p. 19.

> satellites will be responsible for the gradual creation of a world-wide "Telematic" network.[1]

Nora and Minc inferred, "Computer based communication systems represent a synthesis of communications with information systems constituting the fundamental technological advance, and this advance is already well underway."[2]

Satellite Business Systems (SBS) is entering the market with a system for world communications. SBA is:

> . . . bringing together existing technology for the first time into a large-capacity production system that integrates voice, data, and image communications in a single network . . . a file so huge that it requires distribution by truck today--to one location at a time--could be transmitted to multiple locations in the U.S. in half an hour.[3]

Schanstra foresaw telecommunications as one of the areas which will have the greatest impact on society because of its ability to enable people to communicate more effectively.[4]

Cockroft agreed with Nora and Minc on the importance of telecommunications in its relationship to other technologies. "It is the development of communications which turns a number of isolated technological developments into a truly integrated and universal information technology."[5]

Cockroft projected:

> The major elements in office communications will be high speed text and data transmission and facsimile transmission--the speed of

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[1]Ibid., p. 23. [2]Ibid., p. 399.

[3]"Gearing up for a Communications Leap," Industry Week, 12 May 1980, p. 24.

[4]Carla Schanstra, "The Computer in Our Lives--The Office," Infosystems 27 (January 1980):52.

[5]David Cockroft, "New Office Technology and Employment," International Labour Review 119 (November-December 1980):692.

> the latter is now being rapidly improved, which is crucial to the transmission of symbols, drawings photographs and writings in scripts such as Chinese and Japanese that do not easily lend themselves to keyboard transmission.[1]

The theme of the 1980 national conference of the Association of Data Communications Users was "Telecommunications--Energy of the Eighties."

> That theme was chosen with a purpose . . . . Competence will be required in data processing, word processing, voice communications, data communications, electronic funds transfer and most of all the distribution system of your company. These services will all merge into one gigantic electronic information system serving the consumer. Competence in data communications will give you the edge in this decade over all other professions. Data communications will be the glue that binds the whole system together.[2]

Schanstra outlined how the technology will grow within the office environment. "Technologies will enter the office from the bottom up. First, you change electric typewriters to electronic typewriters, then you add a display, then you connect to a central processing unit."[3]

Word Processing

National Organizations' Research

The International Word Processing Association (IWPA) and Duetsch, Shea & Evans, Inc., (DS&E), a New York firm specializing in human resources communications and consulting, completed a study in 1979 reporting the responses of 1103 word processing managers and executives on questionnaires which had been sent to 5500 organizations. The purpose of the study was "to develop data on the employment aspects--and to some degree the equipment use--in the word processing field." From the study,

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[1]Ibid.

[2]August H. Blegen, "Communications Will be the Emerging Technology," The Office 93 (January 1981):150.

[3]Schanstra, p. 52.

one of the major problems associated with recruiting and retaining qualified personnel appears to be the low salary for the position. Management was cited in several responses for not realizing the worth of the technicians.[1] Spelling and punctuating ability appeared several times as being a necessary characteristic for job performance. Many comments of the respondents concerning the attracting and keeping of secretaries in general were the pay is too low and the duties too monotonous to entice intelligent, motivated, and capable personnel.

A fifth of the respondents reported that they have no problems in staffing. However, as their comments show, other personnel-related problems are surfacing.[2]

Examples such as the following were given:[3]

No problem with staffing. Biggest problem is absenteeism.

We only have one WP unit so staffing itself is not a problem. It's the staff that's the problem.

No problems staffing, only problem is with egos of principals.

The lack of language skills was repeatedly given as a problem in finding qualified personnel. The following are examples of comments received and quoted in the study.[4]

Finding qualified spellers and speed typists . . .
Finding applicants who can spell
Often experienced typists have poor grammar and spelling skills . . .
Strong English background--students lack desperately in this area
Major problem is finding secretaries with good language arts skills . . .
Finding qualified typists who can spell . . .

Finding people with machine experience and/or interest in the word processing environment was another aspect of the staffing problem.

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[1]Human Resources and Word Processing, Study by the International Word Processing Association and Deutsch, Shea & Evans, Inc. (Willow Grove, Pennsylvania: International Word Processing Association, 1979), pp. 1-40.

[2]Ibid., p. 43. [3]Ibid. [4]Ibid., pp. 37-38.

From the national study conducted by Delta Pi Epsilon, ninety-four percent of the supervisors responding indicated that word processing operators were at times used for administrative secretaries. The study stated, "This policy would appear to indicate that word processing personnel should not only be qualified to operate equipment but also to carry out many administrative secretarial functions as well."[1]

The supervisors and word processing operators agreed on the weaknesses of operators. "All the weaknesses related to English skills--inadequate grammar skills, inadequate knowledge of punctuation, inadequate vocabulary or lack of specialized terminology and lack of skill in using the dictionary."[2]

The competencies most needed by entry-level Word Processing Operators were found to be competence in listening, following directions, and typewriting with accuracy. Other competencies deemed very important by 74 percent or more of the respondents were (1) keyboarding documents with satisfactory turn-around time, (2) proofreading typed documents, (3) typing letters and memos, and (4) typing both from typed copy and rough draft.[3]

Other competencies listed as very important by over half the respondents were (1) typing other applications such as reports, tabulated materials, and from handwritten notes and machine dictation, (2) keyboarding and revising information on magnetic tape or cards, (3) setting priorities on documents and tasks, and (4) handling confidential correspondence and data.[4]

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[1]Ibid., p. 9. [2]Ibid., p. 3. [3]Ibid. [4]Ibid.

University Research

Dorrell and Johnson of Lamar University are in the process of conducting a study titled, "The Impact of Word Processing in Major Oil Companies in the United States." Thirty companies were selected for the survey and of these ten companies were to be studied by personal interview. The interviews were completed and the remaining companies are currently being surveyed by mail questionnaires. Figure 5 is a summary of the major findings which were presented to the participants of the Southwest Administrative Services Association's Annual Meeting held in New Orleans.

FIGURE 5

SUMMARY OF MAJOR FINDINGS

The representatives of all companies interviewed agreed that word processing will assume a greater work load in the next five years. They also foresee an increase in electronic work stations and a sustained push for productivity.

Other projections and implications for business educators include the following:

1. Word processors will continue to assume the major portion of the typewriting work load, thus freeing administrative assistants to perform more varied, paraprofessional duties

2. Distributed word centers will be the most widely used configuration. Reduced cost has made it economically feasible to install units at more desks. This arrangement which puts support personnel near principals will give the originator greater access to and control of documents.

3. Industry's need for better language skills for word processors should be met by business educators who increase their teaching emphasis on these skills

4. Job hopping and work as a temporary employee will remain attractive to the word processor who has experience on different types of sophisticated equipment

5. Training for word processing should include, as a minimum, terminology, equipment capabilities, and operation of equipment, with some hands-on training

FIGURE 5 (Continued)

6. Productivity will continue to be emphasized. Students should be prepared to work under the pressure of work standards and measurements.

SOURCE: Jean Dorrell and Betty S. Johnson, "The Impact of Word Processing in Major Oil Companies in the United States," paper presented at the Southwest Administrative Services Association's Annual Meeting, New Orleans 5-8 March 1981.

Tuma found, "A great majority of the respondents indicated employee weaknesses in the areas of grammar, spelling, punctuation, and written and oral communications . . . ."[1]

In the area of knowledges and competencies Tuma recommended, "More classroom time should be allocated to exercises in time management, setting priorities, and teaching students how to function under pressure."[2]

Tuma also recommended, based on the study, "At the introductory level of typewriting, such skills as accuracy, proofreading, and formatting should be emphasized more."[3]

Selected findings of Moody's study on identifying competencies for word processing secretaries are listed in Figure 6. The competencies illustrated were considered important by the respondents from the twenty-five centers in South Carolina and 50 to 100 percent of the respondents recommended the items be taught in school.

Periodicals

The position of word processor is known by many titles, examples are: word processing technician, WP operator, magnetic keyboard specialist, transcriptionist, and WP typist. Whatever the title, the person

[1]Tuma, p. 27. [2]Ibid., p. 45. [3]Ibid., p. 46.

FIGURE 6

COMPENTENCIES FOR WORD PROCESSING SECRETARIES

Typewriting Cluster

1. Type with speed
2. Type with accuracy
3. Type letter, memos, reports, tabulated materials, and statistical data
4. Keyboard information on magnetic tape or cards
5. Type from handwritten notes, dictation machines, typed copy and rough drafts
6. Change typewriter ribbons, care for equipment
7. Type carbon copies
8. Keyboard documents with satisfactory turn-around time
9. Correct errors by correction tape, backspace technique
10. Operate electric typewriter, correcting selectric, memory typewriter
11. Produce copies by automatic playback
12. Revise previously typed work by correcting magnetic cards or tape

Dicatation and Transcription Cluster

1. Transcribe machine dictation with speed and accuracy
2. Demonstrate competency in listening skills, following directions
3. Proofread all typed documents

Data Collection and Research

1. Use a dictionary, secretary's manuals, thesaurus, telephone directory

Grammatical Skills Cluster

1. Read and interpret business documents
2. Spell, punctuate, capitalize
3. Proofread
4. Alphabetize
5. Construct correct sentences
6. Sequence sentences in a paragraph
7. Recognize and correct improper sentence structure
8. Demonstrate acceptable vocabulary

SOURCE: Patricia G. Moody, "Identification of Entry-Level Competencies and Focus of Training for Word Processing Secretaries in South Carolina" (Ph.D. dissertation, University of South Carolina, 1978), p. 162-163.

performs keyboarding functions and prepares a variety of documents in final form. Well itemized typical duties as editing, formatting and layout, handling revisions, maintaining daily records and logs, proofreading, storing and filing magnetic media, and upgrading programmed stored data.[1]

To fulfill these duties, Well listed the following requirements for entry-level positions in word processing.[2]

Excellent language arts skills
Fast and accurate keyboarding (60-100 wpm)
Efficient machine transcription (30-50 wpm)
Machine oriented
Able to visualize final copy
Able to work under pressure of time
Concentrate despite noise and distractions
Sit at work station for long periods of time while operating machine

Casady, well-known writer in the area of word processing, in an article, "Word Processors are Made not Born,"[3] categorized brief outlines for three different courses in word processing. Casady recently published a complete textbook for a beginning word processing course. In the book, Casady has listed the skills, knowledges, and characteristics she believed necessary for correspondence secretaries.[4]

Ability to type with speed and accuracy and transcribe the intended meaning

Willingness to operate new machines and to adopt new procedures

Command of the language--grammar, spelling, punctuation, capitalization, and word usage--proofreading skills; detail oriented

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[1]Mimi Well, ed., "Skills and Concepts Needed by WP Personnel," Progressive Office Educator 1 (North Scituate, Mass.: Kent Publishing Co., Spring 1979):1.

[2]Ibid.

[3]Mona Casady, "Word Processors are Made not Born," Business Education Forum 34 (January 1980):14-15.

[4]Mona Casady, Word Processing Concepts (Cincinnati: South-Western Publishing Company, 1980), pp. 162-163.

Willingness to remain seated for extended periods of time

Ability to use time wisely, to work under deadline pressure, to set priorities, and to keep confidences

Initiative, punctuality, dependability, loyalty, and creativity in designing formats

Positive and cooperative attitude when working with others

Knowledge and understanding of word processing concepts

Operator turnover is integral to the efficiency of a word processing center. One way this problem can be lessened is by implementing an effective screening program. An investigation published by Word Processing World summarized skills and characteristics several word processing supervisors utilized in selecting applicants for their respective centers.[1]

Proudy, Blue Cross and Blue Shield of Maryland in Baltimore, analyzed grammar, spelling, and punctuation skills from the written application. Command of the English language was evaluated during the interview. Applicants must be able to type 50 wpm without errors. She also finds experienced secretaries often are unaccustomed to a production environment and may not react positively to the word processing setting; therefore, she does not require experience.

Reed, at Ohio Wesleyan University, trains unskilled applicants but prefers experienced secretaries. Close attention is given to references before hiring.

Dalton, with Boy Scouts of America in New Jersey, gives first priority to employees within the company who wish to be promoted. Typewriting and spelling tests are administered to the potential employees. Dalton prefers some experience with text-editing and transcription equipment with a goal of high-quality production.

Warton, First National Bank of Albuquerque, declared; "I look for good typing skills with reasonable grammar and spelling. The applicant's work record and credit record is investigated before employment."[2]

Jernigan, Miller Morton Company in Richmond, Virginia, looks for someone with a grammar and English background who is also a pretty good typist. Tests are given for spelling, grammar, and typewriting.

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[1]Walter A. Kleinschrod, ed., "How Supervisors Screen Applicants for Operator Positions," Word Processing World 4 (July-August 1977):42-43.

[2]Ibid.

Altree, Jenkine and Perry Law Firm, looks for a person who does not wish to be a secretary but enjoys typewriting. High priority is given for experience and to a person who can think while handling original material. Altree preferred "a brighter girl rather than a fast typist with some equipment experience."[1]

The supervisors also pointed out that an applicant might be qualified but personality conflicts would cause failure on the job and true personalities do not always come through during an interview.

The above items were ideal situations for hiring word processing personnel. The supervisors were well aware that rigid rules for hiring might result in an empty word processing center.

Meroney, Word Processing Supervisor of Price, Waterhouse, and Company in Washington, D.C., contended a "qualified applicant" in word processing starts with a fundamental educational background. Meroney's key areas for word processing are typing skills, transcription of dictation, proofreading, grammatical skills, use of resource materials, mathematics, and concepts and theory of word processing.[2]

Schramm stated proofreading should be seriously considered in educational programs. According to Schramm:

> As regards the new occupations created by automation in offices and in particular, word processing on composing and editing machines, the linguistic requirements (comprehension and communication skills) are increasing rather than diminishing since a qualified secretary will also be asked to do proof-reading. Much more attention should be given proof-reading techniques in future training programs.[3]

Lewis completed a study which sought to determine relationships of selected characteristics of organizations with word processing centers

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[1]Ibid.

[2]John W. Meroney, "Word Processing--What Skills Should an Entry-Level Applicant Have?" Century 21 Reporter (Cincinnati, Ohio: South-Western Puslishing Company, Fall 1970), p. 5.

[3]Karin Schramm, "Business Education for the Future," International Labour Review 119 (January-February 1980):120.

to: (1) business letter organization methods, (2) quality of business letters, (3) quantity of business letters written, (4) turn-around time for business letter output, (5) current letter styles used by word processing centers, and (6) extent to which form letters are used. A total of 1000 questionnaires were mailed to organizations systematically selected from a word processing magazine list and 320 usable questionnaires were returned.[1]

Lewis found the speed, quality, and quantity of business letters were all increased after the organization implemented a word processing system. Lewis concurred: ". . . the specialized training of word processing operators along with the sophisticated equipment being used undoubtedly accounted for a great percentage of these increases.[2]

Lewis stressed:

> The use of word processing is growing dramatically in many businesses, organizations, and within government . . . .
> High school and college instructors should familiarize their secretarial students with word processing concepts, integrating hands-on experience with word processing equipment whenever possible. Continued growth of word processing within the business world will create a demand for trained personnel. Students who possess this training will have an advantage in applying for available jobs.[3]

Anderson saw the total effects of word processing usage as being beneficial to the degree that business and education cooperate.

> Word processing can offer a practical solution to the problems of handling typed or printed communications quickly and efficiently only if well qualified workers are available. This will require cooperative effort on the part of business and education.[4]

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[1]Stephen D. Lewis, "The Effect of Word Processing on Business Letter Writing," Delta Pi Epsilon Journal 21 (April 1979):26.

[2]Ibid., p. 31. [3]Ibid., p. 32.

[4]Ruth I. Anderson, "Education for New Careers," Word Processing 4 (July/August 1972):6.

Merging

Cockroft commented on an international view of office technology presently in use:

> Office equipment currently available in Western markets includes word (or text) processors; small business computers, optical character recognition equipment, computer controlled telephone exchanges and switching systems; facsimile transmitters, and mass electronic storage devices.[1]

The important aspect of the technology is the converging of the different elements into one integrated system.

> Ten years ago there was little technical connection between the manufacture of typewriters (now developing into word processors), telecommunications equipment (then entirely electromechanical) and computers. Today the same skills, the same components and the same principles cover all three areas. The real importance of office technology is in the use of integrated office systems in which every product fits in with and encourages investment in the other.[2]

Lambrecht is in agreement with Cockroft as she has remarked:

> The keen importance of computerized data processing for today's business needs little elaboration. It is assured that all office workers will continue to encounter an increasing number of computerized applications in their jobs. Increased automation of administrative office functions through the development of word processing systems is one illustration of the potential merging of traditional office information systems and data processing systems.[3]

Burford in a study, "Developing Trends in Office Technology and Career Paths as Related to the Office of the Future," found word processing, data processing, micrographics, and telecommunications to be part of today's office. In addition, Burford's study indicated "communication terminals, data retrieval, computer knowledge, and telephone techniques were viewed by a greater number of respondents to be

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[1]David Cockroft, p. 691. [2]Ibid.

[3]Judith J. Lambrecht, "Data Processing Personnel," The Changing Office Environment, in National Business Education Yearbook, no. 18 (Reston, Virginia: National Business Education Association, 1980), p. 166.

more important than dictating equipment.[1] Table 2 is an extract from Burford's table giving the number of responses according to the perceived importance of equipment knowledge for 1981.

TABLE 2

PERCEIVED KNOWLEDGE NEEDED FOR 1981

	Not Important	Not Very Important	Important	Very Important	Extremely Important
Computer Knowledge	5	12	22	47	92
Microform Knowledge	21	23	35	35	48
Machine Transcription (Includes Punctuation)	88	21	18	21	30
Dictating	75	19	31	22	31
Telephone Techniques	10	8	25	40	95
Data Retrieval	28	19	26	27	78
Communication Terminals	25	13	25	38	77
OCR Equipment	71	13	28	28	38
Automatic Typewriters	70	20	33	20	35
Arrange Teleconferencing	64	25	40	23	26

SOURCE: Burford, "Developing Trends in Office Technology and Career Paths as Related to the Office of the Future," Delta Pi Epsilon Journal 23 (January 1981):28.

Three conclusions made by Burford concerning insurance companies supported the claims of current literature relating to technology. The first conclusion dealt with equipment: "Employees are well aware of trends that relate to the office of the future, as three-fourths of the

[1]Burford, "Developing Trends in Office Technology and Career Paths as Related to the Office of the Future," p. 22.

respondents had knowledge of other equipment beyond that which they were presently using." The second conclusion concerned the expected merging of technologies for office use: "Office systems that integrate word processing and data processing into a more comprehensive and 'intelligent' information processing system are anticipated office systems for the future." The third conclusion stated the expected usage of minicomputers as becoming an "integral part of office operations and procedures."[1]

Morgenbrod and Schwartzel, of Central Research and Development in Munich, reported on unpublished information generated by a Sieman task force study which is titled, "The Office in 1990."[2] The activities found to be the most conducive to technical modernization in order of importance were:

(1) Production and processing of texts and data. These should see the most dramatic changes within the office

(2) Communication of data, texts, and graphic information. Telecopying could develop into an internal mail system

(3) Documentation, picture processing and oral communications[3]

Ash emphasized the office is now in a position to deal with the total information system instead of breaking recorded information into three forms: numeric, alphabetic, and graphics, each requiring its own separate technology and support system. Concerning data processing and graphics, Ash wrote:

> Data processing was separate--even insulated--from the more clerical processes of handling alphabetic information. Graphic

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[1]Ibid.

[2]Horst Morgenbrod and Heinz Schwartzel, "How New Office Technology Promotes Changing Work Methods," Management Review 68 (July 1979):42.

[3]Ibid., p. 43.

> information, particularly that involving photographs and illustrations, was in many ways even more remote as to process and function.[1]

Ash sagaciously stated this "separateness of form and process has been burdensome . . . . Technology can now enable numerics, alphabetics and graphics to flow as one."[2]

What was needed was to bring the processes together, and this can now be accomplished.

> The magic of the chip and the microprocessor has been unbottled from the computer room and is coming to rest everywhere. At last, we are able to deal with the whole broad spectrum of information in general rather than merely one of its forms--that of numbers.[3]

In an article published in Infosystems, Weiszmann, editor of the "Autotransaction Industry Report," remarked: "The larger more sophisticated users will be the first ones to upgrade their WP systems into networks that transmit data to DP centers."[4] Davidson, senior vice president of Mohawk Data Sciences, anticipated that communicating computers, what we know also as distributed processing, will be looked to in the future as the logical way to supply word processing. The article gave true office automation as a combination of text, data, graphics, and voice.

> Office automation products will go beyond simple text editing to become a complex of activities employing copiers, duplicators, typesetting, facsimile, telephone, micrographics, and data processing. The automated office of tomorrow will entail a myriad of complex equipment interfaced with data processing to form a sophisticated system.[5]

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[1]Roy L. Ash, "Information Processing: Fundamental Changes Coming," The Office 89 (May 1979):82.

[2]Ibid. [3]Ibid., p. 63.

[4]Wayne L. Rhodes, Jr., ed., "Information Processing Emerges From Integration," Infosystems 26 (December 1979):37.

[5]Ibid.

Connell agreed with Rhodes in the multiforms of technologies that will be utilized within the office environment. However, a warning is sounded as to the anticipated rate of change due to the inequities of age in the various concepts.

> The . . . factor for information processing professionals to recognize is that computers are only one of a number of technologies that will be used in the future office. Such technologies as word processing, reprographics, teleconferencing, micrographics, and electronic mail, to name a few, are equally important. Further, while computing technology is relatively mature, the others are not and the rate of change capabilities and characteristics is substantially greater than that of computing.[1]

Many of the larger companies do realize the benefits available as Norris reported from his study:

> Eighty-five percent of the companies have appointed individuals or committees to be responsible for office automation activities. The establishment of these positions is a relatively new phenomenon with 64 percent of the appointments occurring during the past 18 months.[2]

In the "Summary Report of National Study of Word Processing Installations in Selected Business Organizations," the following summaries were made regarding the interaction of word processing and data processing.

> All respondents agreed that there will be greater information interaction between word processing and data processing. The respondents were evenly divided, however, in their beliefs concerning the extent or nature of the relationship. Some indicated that the two areas will be indistinguishable and merge into information processing. Others indicated that, although there are similarities in technology, they anticipate continued organizational separation for some time.[3]

One thing is certain, however, the two will be more closely related in the future. The experts taking part in the Delta Pi Epsilon study all concurred that there will be greater information interaction.[4]

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[1]Connell, p. 84. [2]Norris, p. 56. [3]Scriven, p. 31.

[4]Ibid.

Computers are rapidly becoming an integral part of the office. Peacock summed the beliefs of many: "Whether hidden as a microprocessor deep in the working of a word processor or disguised as main frames that use word and text processing software, computers are storming the office."[1]

DeGenaro, Strategic Planning Manager of 3 M's Business Products Group, declared, "By 1985, there will be little or no distinction between DP and WP. The merging of the two capabilities that began in the seventies will become commonplace in the eighties."[2]

Summary

The purpose of this chapter was to provide a review of the literature, including past and present research, pertinent to the area of job qualifications for Information Processing personnel.

The information in the chapter illustrated that managers in business and industry were in close agreement with researchers regarding qualities necessary for entry-level employment in data processing and word processing. For example, agreement was found in terms of general knowledge, skill qualifications, and behaviorial traits needed by entry-level employees in data processing and word processing. Common grounds of agreement were found between authors in journal articles and the formal researchers concerning the need for a curriculum pertaining to the electronic technologies utilized in offices.

The formal research reviewed by the investigator as well as research presently being conducted relates to either data processing or

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[1]James Peacock, "Trends in Computing," Fortune, 19 May 1980, p. 62.

[2]Scriven, p. 32.

word processing. No research was encountered relating to electronic files or telecommunications. The investigator was unable to discover a past research study or a study in process which attempted to integrate the technologies for the processing of information combining data and word processing in the offices of business and industry.

CHAPTER III

METHODOLOGY

Introduction

The purpose of Chapter III is to present the methodology used for the study on work-related characteristics. Chapter III has been divided into six major sections, an introduction, and a summary. Contained in the section, Background, is a brief review of the reasons which led to the present study being conducted. Covered by the section, Population, is the selection process for the participants. In the section, Interview-Questionnaire, the method by which the instrument was constructed and the rationale for the method are presented. In the section, Pilot Study, the steps by which the instrument was validated are enumerated. The methods used in obtaining the responses are elucidated in the section, Interviews. Included in the section, Data Analysis, is an explanation of the interpretative methods used for presentation of the collected data.

Background

In the beginning, the study involved a preliminary search of related literature to determine what had been published in the area of entry-level requirements for Information Processing. The findings of the preliminary search led to the conclusion that no research had been attempted in the area of Information Processing for entry-level personnel. An extensive search of the literature was then undertaken by the investigator.

The following sources were used as a basis for the search of related literature.

Dissertation Catalogs

Educational Resources Information Center (ERIC)

Business Periodical Index

Business Education Index

Current Index to Journals in Education (CIJE)

Personal and Telephone Conversations

Conversations were conducted in person and by telephone with persons involved in present research in data processing and word processing. The findings of the extensive search were the same as had been determined during the preliminary search. Research had been done to identify personal characteristics of office workers. Research had been completed in different aspects of data processing to help identify knowledges and skills needed for employment in the area. Research had been completed in word processing to identify work characteristics of entry-level employees. The research covered the time period when the areas were not as advanced as at the present time. Published articles contained factors relating to electronic filing and the necessity of utilizing data base management techniques to expedite the flow of information resources for decision making by all levels of management. Articles have been published expounding the benefits of merging the technologies used for information processing in business and industry. A new title is emerging termed IRS for Information Resources Management but no formal research was found related to the subject of merging the information technologies.

No formal research was found related to the newest technology for business and industry--telecommunications. Nor could research be

found which attempted to do what many authors are claiming must be done--integrate the technologies used for processing information for decision-making in business and industry.

Population

It is difficult to state precisely what is needed by entry-level personnel over an extended period of time in the rapidly changing world of electronic technology. One assumption seems apparent--to identify work characteristics for entry-level personnel in a particular geographical area, the business and industry in the same geographical area must be surveyed. For this reason and also due to the stronger possiblity of reaching more large companies, which presumably would have had more experience with the use of electronic technology for processing information, Oklahoma City was selected as the area to be investigated.

The Center for Economic and Management Research in the College of Business Administration at the University of Oklahoma in Norman was contacted for assistance. The Center was requested to help identify the larger companies in the Oklahoma City Metropolitan Area. A listing was available entitled, "Statistical Abstract of Oklahoma 1980,"[1] published by the Center for Economic and Management Research. The list included all companies in the State of Oklahoma which employed 500 or more employees. It was determined from the list that 41 of the companies were located in the Oklahoma City Metropolitan Area.

Due to the type of study being conducted, it was necessary to use companies with a computer based in approximately the same area as

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[1]Dikeman.

the company. If it were company policy to send the majority of the information out of the area for processing, the company's name was excluded from the companies to be used when interviewing.

Interview-Questionnaire

An interview-questionnaire was used to "serve as a structural set of questions . . . during the personal interview"[1] in each company. The interview method of collecting data was considered most appropriate for this study because of the attempt to merge what many people still consider separate technologies in processing information for decision-making. "The structured questionnaire added the extra dimensions of standardization and sequencing to the interview process, as well as providing specific locations and coding possibilities for the obtained answers."[2]

According to Semprevivo:

> Whenever possible, direct personal issuance of the questionnaire should be attempted. Issued on a one-to-one basis, the questionnaire is readily completed, and a high degree of confidence can be placed in the accuracy of the responses.[3]

Semprevivo cautions that if direct issuance of the questionnaire is not done the responses may not reflect the true conditions due to the questionnaire being completed by persons whose knowledge of the subject is limited.[4]

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[1]George W. Morgan, "Testing the Applicability of a Reciprocal Allocation Model for Within School District Expenditures" (Ph.D. dissertation, University of Oklahoma, 1979), p. 30.

[2]Ibid., p. 31.

[3]Philip C. Semprevivo, Systems Analysis: Definition, Process, and Design (Chicago: Science Research Associates, Inc., 1976), p. 82.

[4]Ibid.

For clarification, the interview-questionnaire on information processing was divided into five major areas of General Knowledge, Data Processing, Electronic Files, Telecommunications, and Word Processing. The first major area involved personal skills and characteristics which were not machine dependent. For further clarification involving the newest technology, Telecommunications was divided into Data Transmission Terminal Equipment, Electronic Mail, and General.

The original interview-questionnaire was constructed from a synthesis of statements found in the research literature, textbooks, personal inteviews, telephone interviews, and suggestions from colleagues in the area of information processing.

The fixed-format interview-questionnaire was constructed according to the guidelines of Semprevivo for developing a questionnaire most likely to be understood by and to elicit responses from the participants.[1] The guidelines included the following:

1. The questionnaire was kept as short as possible
2. The questionnaire was divided into sections for easier reading
3. The same order of response alternatives was maintained throughout the questionnaire
4. An easy to answer format was utilized
5. Professional printing services were used to ensure the type was clear and legible

Validation

For validation by teachers in the field of business education, the interview-questionnaire was submitted to a panel of experts from the Business Advisory Committee for the Business and Economics Department at

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[1]Ibid., pp. 76-81.

the University of Science and Arts of Oklahoma in Chickasha. Five members were currently teaching data processing.

For validation by business and industry, five companies were selected from the forty-one companies listed in the "Statistical Abstract of Oklahoma 1980"[1] for a pilot study using the interview-questionnaire as revised by the Advisory Committee. Each company selected for the pilot study represented a different type of business or industry. The types of companies interviewed for the pilot study were a bank, a manufacturing company, an energy related company, an insurance company, and a hospital.

The first contact with each company was by telephone. Personnel answering the telephone were able to give information as to whether the company processed information in the approximate area or if the information were sent out of the area for processing. Only companies processing in the local area were asked for an interview. If the company processed within the local area, the investigator asked to be connected with a manager in the area of Information Processing and appointments were made at the convenience of the participants. All managers in the companies selected for the pilot study graciously agreed to the interview procedure. During the pilot study all interviews scheduled were completed at the appointed times.

The titles of the participants varied from company to company. Each company decided on the number and type of personnel who would be helpful in validating the interview-questionnaire. The participants rated the items on the instrument as to the importance to their particular

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[1]Dikeman.

organizations and made suggestions as to additions and deletions which would represent the present day requirements for entry-level personnel.

At the conclusion of the pilot study, all suggestions were anlayzed and changes made in the interview-questionnaire. Each major area was left intact with revisions made to the items listed under the major areas. Additions and deletions were made in accordance with the suggestions of the participants unless it was believed the item suggested was unique only to the particular company. Wording on some items was changed to correspond with local usage.

The final instrument contained 160 items under the five major areas of General Knowledge, Data Processing, Electronic Files, Telecommunications, and Word Processing. Six demographic factors were added to the instrument to provide a better background of the participating companies.

The managers in the companies interviewed believed the responses would be more freely given if the participants' personal names and the names of the companies were not made public. Therefore, a declaration stating that personal names and company names would not be used in the study was printed on the final instrument.

Interviews

The information managers in twenty-seven companies were interviewed in the Oklahoma City Metropolitan Area. Forty-one companies were listed on the "Statistical Abstract of Oklahoma 1980." Five companies were interviewed for the validation of the interview-questionnaire and nine of the companies sent their information out of state to be processed. The management in the twenty-seven companies remaining who were asked for an interview graciously consented.

Each company was first contacted by telephone. Interviews were requested only if the company processed information within the approximate area of the Oklahoma office. The purpose of the study was explained, and the participating managers decided upon the number and type of personnel which would be beneficial to the interview. The number of people within the company who were to be interviewed ranged from one to six. Those participants deciding to use several people for the interview usually set the appointments within approximately one to two weeks from the date of the request to assure time would be available for all parties. Only one company failed to be interviewed on the specified date and this was due to a major emergency within the organization. The interview was rescheduled for a week later. Most of the interviewees arranged a conference whereby all participants within the company could come together at the same time for the interview. The titles of the interviewees were varied. Some of the titles of the participants were Personnel Manager, Systems Manager, Manager of Information Systems, Data Processing Manager, Word Processing Manager, Product Division Manager, Manager of Information Services, Program Manager, Vice President Computer Services, Data Base Administrator, Site Manager, and Vice President Data Systems.

If more than one person were interviewed, each person was given a copy of the interview-questionnaire, and after the purpose of the study had been explained, one person would mark the responses for the group. If more than one interview were conducted within a company, each person would mark a sheet, and the answers were combined on one questionnaire by the investigator in order to have one response from the company.

The length of the interviews was approximately two hours per company.

Data Analysis

The data were analyzed utilizing computer programs from the Statistical Package for the Social Sciences (SPSS).[1] A numerical value was assigned to each of the five choices available to the participants in rating 160 of the items on the interview-questionnaire. The values assigned were as follows:

Critical	1.000
Necessary	2.000
Possible	3.000
Unnecessary	4.000
Uncertain	5.000

All items (166) were coded and keypunched in computer cards using one column for each item. Due to a verifier not being available to the investigator, the keypunching was verified twice by the "calling method." The mistakes found were marked and the cards keypunched, and again were verified by the "calling method."

According to Huck, ". . . descriptive statistics are concerned only with characteristics of the set of data obtained by the researcher, inferential statistics are concerned with generalization to a population larger than the set of data obtained by the researcher.[2]

Due to the present study being a collection of data from a select population and not a random sample, it was pertinent to utilize methods of descriptive statistics. The mean appeared the most relevant of the common measures of central tendency.

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[1]Nie, pp. 185-202.

[2]Schuyler W. Huck, William H. Cormier, and William C. Bounds, Jr., Reading Statistics and Research (New York: Harper and Row Publishers, 1974), p. 19.

A mean was computed for each of the 160 items by use of the program Condescriptive from the Statistical Package for the Social Sciences.[1] Any item receiving a mean of 1.0 through 1.75 would be considered critical for entry-level employment. Any item receiving a mean of 1.751 through 2.5 would be considered necessary for entry-level employment. Items receiving a mean of over 2.5 should be reviewed for possible need by smaller companies or for possible need by companies in different geographical locations.

The program Crosstabs was utilized to present a percent of responses under the response scale of critical, necessary, possible, unnecessary, and uncertain for 160 items. The items were also presented as a percent of the total responses by company size. The size of the companies was determined by the number of employees. One group consisted of companies with 500 to 1000 employees and the second group consisted of companies with over 1000 employees.

The Crosstabs program was also utilized to highlight percents found in the six items relating to demographic factors.

Summary

The procedures used in designing and conducting the study have been presented in Chapter III. The background which led to the study was briefly reviewed. The development of the interview-questionnaire was explained, and reasons were included for the use of personal interviews for the study. An explanation of the pilot study was discussed, and the data collection process presented. The statistical procedures used to analyze the data were identified.

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[1]Nie, pp. 185-202.

CHAPTER IV

PRESENTATION OF DATA

Introduction

Data were obtained through the use of interview-questionnaires pertaining to characteristics and skills needed for entry-level employment in Information Processing. The instrument utilized in the study listed 166 items divided into six major areas: General Knowledge, Data Processing, Electronic Files, Telecommunications, Word Processing, and Demographic Factors.

To facilitate organization and clarity, the data have been presented in the same order as was used in the collection process with each major area being subdivided into related categories as were printed on the interview-questionnaire. The participants responded to the questions which contained a five-point scale (1) critical, (2) necessary, (3) possible, (4) unnecessary, and (5) uncertain.

Statistical means of each item, secured by executing the Condescriptive program of the Statistical Package for the Social Sciences,[1] were utilized using the following:

(1) An item having a mean of 1.0 through 1.75 will be considered critical for entry-level employment.

(2) An item having a mean of 1.751 through 2.5 will be considered necessary for entry-level employment.

(3) An item having a mean of over 2.5 should be viewed again for use in different localities or for use by smaller companies.

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[1]Nie, pp. 185-202.

Percents of responses were secured by executing the Crosstabs program of the Statistical Package for the Social Sciences.[1] All Crosstabs analyses are included in Appendix B.

General Knowledge

The major area of General Knowledge included fifty-two items under five general categories entitled: Entry-Level Personnel Should Have General Knowledge Of/In, Entry-Level Personnel Should Have Understanding Of, Work Habits of Entry-Level Personnel, Personal Attitudes of Entry-Level Personnel, and Personal Traits of Entry-Level Personnel. The items listed in this section represent general characteristics, skills, and/or knowledges needed for employment in Information Processing. The items were considered machine independent as related to technological skills.

Entry-Level Personnel Should Have General Knowledge Of/In

Nineteen items were listed under the category "Entry-Level Personnel Should Have General Knowledge Of/In." Sixty-nine percent (13) of the items in the category received a mean rating of 2.5 or lower indicating the items were critical or necessary for entry-level employment in Information Processing. Table 3 includes the listing of all nineteen items in "Entry-Level Personnel Should Have General Knowledge Of/In" with corresponding statistical means.

Three items in the category received a mean rating of 1.75 or lower. A mean within the range of 1.0 through 1.75 indicated the participants considered the item critical for entry-level employment in Information Processing.

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[1]Ibid., pp. 218-247.

TABLE 3

ENTRY-LEVEL PERSONNEL SHOULD HAVE
GENERAL KNOWLEDGE OF/IN

(Statistical Means)

Item	Mean
Basic tools of information systems analyst	2.462
Information system's development concept	2.333
Computation skills:	
General math	1.704
Algebra	2.407
Boolean algebra	3.074
Numbering systems	2.444
Communications skills:	
Oral:	
Speaking	1.704
Listening	1.296
Written:	
Letters	2.000
Reports	1.926
Basic office skills:	
Typewriting	2.185
Office machines	3.000
Bookkeeping	2.778
Transcription	2.926
Vocabulary:	
General Business	2.148
Accounting	2.185
Computer	1.778
Business cycles	2.741
Economic literacy	3.074

The three items were: Computation skills--General math (1.704), Oral communications--Speaking (1.704), and Oral communications--Listening (1.296). (Oral communications--Listening received the lowest mean rating in the category and the second lowest in the section of General Knowledge with only "Respects confidential material" (1.259) being lower.) Ten items in the category received a mean rating within the range of 1.751 through 2.5. A mean within the range of 1.751 through 2.5 indicated the participants considered the item necessary for entry-level employment in Information Processing. The ten items were: Vocabulary--Computer (1.778), Written--Reports (1.926), Written--Letters (2.0), Vocabulary--General business (2.148), Basic office skills--Typewriting (2.185), Vocabulary--Accounting (2.185), Information system's development concept (2.333), Computation skills--Algebra (2.407), Computation skills--Numbering systems (2.444), and Basic tools of information systems analyst (2.462).

It was observed that the participants' answers to six items included in "Entry-Level Personnel Should Have General Knowledge Of/In" resulted in a mean of 2.5 or higher. The items were Computation skills--Boolean algebra (3.074), Basic office skills--Office machines (3.0), Basic office skills--Bookkeeping (2.778), Basic office skills--Transcription (2.926), Business cycles (2.741), and Economic literacy (3.074).

Sixty-three percent (12) of the items in "Entry-Level Personnel Should Have General Knowledge Of/In" received over 50 percent of the responses as being either critical or necessary. Four items received over 90 percent of the responses as either critical or necessary. The four items were: Communication skills--Listening (100.0), Computation skills--General math (96.2), Communication skills--Speaking (92.5), and Vocabulary--Computer (92.6).

Displayed in Tables 4 through 7 are the analyses of responses by company size for the four items which received over 90 percent of the responses as either critical or necessary.

Illustrated in Table 4 is the analysis of responses by company size to the item, Communication skills--Listening. Communication skills--Listening was rated critical by 70.4 percent of the participants and was rated necessary by 29.6 percent of the participants for a total return of 100 percent as either critical or necessary.

TABLE 4

ANALYSIS OF RESPONSES BY COMPANY SIZE

(Communication Skills--Listening)

Companies by Size	Percent of Responses		Company Size Percent Totals
	Critical	Necessary	
500-1000	25.9	14.8	40.7
Over 1000	44.5	14.8	59.3
Totals	70.4	29.6	100.0

Illustrated in Table 5 is the analysis of responses by company size to the item, Computation skills--General math. Computation skills--General math was rated critical by 33.3 percent of the participants and was rated necessary by 62.9 percent of the participants for a total return of 96.2 percent as either critical or necessary.

TABLE 5

ANALYSIS OF RESPONSES BY COMPANY SIZE

(Computation Skills--General Math)

Companies by Size	Percent of Responses		Company Size Percent Totals
	Critical	Necessary	
500-1000	18.5	18.5	37.0
Over 1000	14.8	44.4	59.2
Totals	33.3	62.9	96.2

Illustrated in Table 6 is the analysis of responses by company size to the item, Communication skills--Speaking. Communication skills--Speaking was rated critical by 37.0 percent of the participants and was rated necessary by 55.5 percent of the participants for a total return of 92.5 percent as either critical or necessary.

TABLE 6

ANALYSIS OF RESPONSES BY COMPANY SIZE

(Communication Skills--Speaking)

Companies by Size	Percent of Responses		Company Size Percent Totals
	Critical	Necessary	
500-1000	14.8	22.2	37.0
Over 1000	22.2	33.3	55.5
Totals	37.0	55.5	92.5

Illustrated in Table 7 is the analysis of responses by company size to the item, Vocabulary--Computer. Vocabulary--Computer was rated critical by 29.6 percent of the participants and was rated necessary by 63.0 percent of the participants for a total return of 92.6 percent as either critical or necessary.

TABLE 7

ANALYSIS OF RESPONSES BY COMPANY SIZE

(Vocabulary--Computer)

Companies by Size	Percent of Responses		Company Size Percent Totals
	Critical	Necessary	
500-1000	14.8	22.2	37.0
Over 1000	14.8	40.8	55.6
Totals	29.6	63.0	92.6

Two items, Computation skills--Numbering systems and Basic office skills--Bookkeeping, were rated critical or necessary by 48.1 percent of the participants.

It was observed from the answers given by the participants that five of the items received less than 48.1 percent in the response scales of critical or necessary. The items were: Computation skills--Boolean algegra, Basic office skills--Office machines, Basic office skills--Transcription, Business cycles, and Economic literacy.

Table 8 contains the percent of responses received under the response scales of critical, necessary, or possible for the nineteen items in "Entry-Level Personnel Should Have General Knowledge Of/In."

TABLE 8

ENTRY-LEVEL PERSONNEL SHOULD HAVE
GENERAL KNOWLEDGE OF/IN

(Percent of Responses)

Item	Percent		
	Critical	Necessary	Possible
Basic tools of information systems analyst	11.5	46.2	30.8
Information system's development concept	8.3	54.2	33.3
Computation skills:			
General math	33.3	62.9	3.7
Algebra	11.1	44.4	37.0
Boolean algebra	7.4	14.8	40.4
Numbering systems	14.8	33.3	44.4
Communication skills:			
Oral:			
Speaking	37.0	55.5	7.4
Listening	70.4	29.6	0.0
Written:			
Letters	22.2	59.3	14.8
Reports	29.6	51.9	14.8
Basic office skills:			
Typewriting	14.8	63.0	11.1
Office machines	0.0	33.3	33.3
Bookkeeping	0.0	48.1	25.9
Transcription	0.0	29.6	48.1
Vocabulary:			
General business	14.8	59.3	22.2
Accounting	14.8	55.6	25.9
Computer	29.6	63.0	7.4
Business cycles	7.4	22.2	59.3
Economic literacy	0.0	18.5	59.3

Entry-Level Personnel Should Have Understanding Of

Six items were listed under the category, "Entry-Level Personnel Should Have Understanding Of." Three items in the category received a mean rating between 1.751 and 2.5 indicating the items were necessary for entry-level employment in Information Processing. The items were: Critical role of information (2.148), Work ethics (1.963), and Competitive aspect of business (2.5). The remaining three items were: Individual's productivity as contribution to society (2.63); Needs, sources, and use of money (2.889); and Increased role of government in production and distribution (3.259).

Table 9 includes the listing of all six items in "Entry-Level Personnel Should Have Understanding Of" with corresponding statistical means.

TABLE 9

ENTRY-LEVEL PERSONNEL SHOULD HAVE UNDERSTANDING OF

(Statistical Means)

Item	Mean
Competitive aspect of business	2.503
Individual's productivity as contribution to society	2.630
Critical role of information	2.148
Needs, sources, and use of money	2.889
Work ethics	1.963
Increased role of government in production and distribution	3.259

Fifty percent (3) of the items in "Entry-Level Personnel Should Have Understanding Of" received over 50 percent of the responses as being either critical or necessary. The items were: Competitive aspect of business (51.8), Critical role of information (74.1), and Work ethics (77.7). The item, Individual's productivity as contribution to society, received a response of 44.4 percent as either critical or necessary. Two items; Needs, sources, and use of money and Increased role of government in production and distribution, received 29.6 percent and 14.8 percent respectively as either critical or necessary. Table 10 contains the percent of responses received under the response scales of critical, necessary, or possible for the six items in "Entry-Level Personnel Should Have Understanding Of."

TABLE 10

ENTRY-LEVEL PERSONNEL SHOULD HAVE UNDERSTANDING OF

(Percent of Responses)

Item	Percent		
	Critical	Necessary	Possible
Competitive aspect of business	11.1	40.7	25.9
Individual's productivity as contribution to society	14.8	29.6	33.3
Critical role of information	18.5	55.6	18.5
Needs, sources, and use of money	7.4	22.2	48.1
Work ethics	33.3	44.4	18.5
Increased role of government in production and distribution	3.7	11.1	44.4

Work Habits of Entry-Level Personnel

Seven items were listed under the category, "Work Habits of Entry-Level Personnel." One hundred percent (7) of the items in the category received a mean rating of 2.5 or lower indicating the items were considered critical or necessary for entry-level employment. Table 11 includes the listing of all seven items in "Work Habits of Entry-Level Personnel" with corresponding statistical means.

TABLE 11

WORK HABITS OF ENTRY-LEVEL PERSONNEL

(Statistical Means)

Item	Mean
Effective use of materials and supplies	2.037
Willing to assume responsibility	1.630
Team-worker	1.556
Effective use of time	1.556
Calm under pressure	1.778
Pleasant under adverse conditions	2.074
Good work-area organization	2.074

Three items in the category received a mean rating of 1.63 or lower indicating the participants considered the items critical for entry-level employment in Information Processing. The items were: Willing to assume responsibility (1.63), Team-worker (1.556), and Effective use of time (1.556). Four items in "Work Habits of Entry-Level Personnel" received a mean rating within the range of 1.778 to 2.074. A mean within the range of 1.751 through 2.5 indicated the participants considered the item necessary

for entry-level employment in Information Processing. The four items were: Effective use of materials and supplies (2.037), Calm under pressure (1.778), Pleasant under adverse conditions (2.074), and Good work-area organization (2.074).

One hundred percent (7) of the items in "Work Habits of Entry-Level Personnel" received over 74 percent of the responses as being either critical or necessary. Three items received over 90 percent of the responses as either critical or necessary. The three items were: Willing to assume responsibility (92.5), Team-worker (96.2), and Effective use of time (100.0). Analyses of responses by company size for the three items which received over 90 percent of the responses as either critical or necessary are displayed in Tables 12 through 14.

The analysis of responses by company size to the item, Willing to assume responsibility, is illustrated in Table 12. Willing to assume responsibility was rated critical by 44.4 percent of the participants and was rated necessary by 48.1 percent of the participants for a total return of 92.5 percent as either critical or necessary.

TABLE 12

ANALYSIS OF RESPONSES BY COMPANY SIZE

(Willing to Assume Responsibility)

Companies by Size	Percent of Responses		Company Size Percent Totals
	Critical	Necessary	
500-1000	22.2	18.5	40.7
Over 1000	22.2	29.6	51.8
Totals	44.4	48.1	92.5

Illustrated in Table 13 is the analysis of responses by company size to the item, Team-worker. Team-worker was rated critical by 48.1 percent of the participants and was rated necessary by 48.1 percent of the participants for a total return of 96.2 percent as either critical or necessary.

TABLE 13

ANALYSIS OF RESPONSES BY COMPANY SIZE

(Team-Worker)

Companies by Size	Percent of Responses		Company Size Percent Totals
	Critical	Necessary	
500-1000	25.9	14.8	40.7
Over 1000	22.2	33.3	55.5
Totals	48.1	48.1	96.2

Illustrated in Table 14 is the analysis of responses by company size to the item, Effective use of time. Effective use of time was rated critical by 44.4 percent of the participants and was rated necessary by 55.6 percent of the participants for a total return of 100 percent as either critical or necessary.

Two items: Effective use of materials and supplies and Calm under pressure were rated critical or necessary by 88.9 percent of the participants. The item, Pleasant under adverse conditions, was rated critical or necessary by 77.8 percent of the participants and the item, Good work-area organization, was rated critical or necessary by 74.1 percent.

Contained in Table 15 is the percent of responses received under the response scales of critical, necessary, or possible for the seven items in "Work Habits of Entry-Level Personnel."

TABLE 14

ANALYSIS OF RESPONSES BY COMPANY SIZE

(Effective Use of Time)

Companies by Size	Percent of Responses		Company Size Percent Totals
	Critical	Necessary	
500-1000	22.2	18.5	40.7
Over 1000	22.2	37.1	59.3
Totals	44.4	55.6	100.0

TABLE 15

WORK HABITS OF ENTRY-LEVEL PERSONNEL

(Percent of Responses)

Item	Percent		
	Critical	Necessary	Possible
Effective use of materials and supplies	11.1	77.8	7.4
Willing to assume responsibility	44.4	48.1	7.4
Team-worker	48.1	48.1	3.7
Effective use of time	44.4	55.6	0.0
Calm under pressure	33.3	55.6	11.1
Pleasant under adverse conditions	14.8	63.0	22.2
Good work-area organization	18.5	55.6	25.9

Personal Attitudes of Entry-Level Personnel

Ten items were listed under the category, "Personal Attitudes of Entry-Level Personnel." Ninety percent (9) of the items in the category received a mean rating of 2.1 or lower indicating the items were critical or necessary for entry-level employment in Information Processing. Table 16 includes the listing of all ten items in "Personal Attitudes of Entry-Level Personnel" with corresponding statistical means.

TABLE 16

PERSONAL ATTITUDES OF ENTRY-LEVEL PERSONNEL

(Statistical Means)

Item	Mean
Believes in free enterprise	2.778
Positive self-image	1.815
High job interest	1.741
Future oriented	1.852
Company committed	2.074
Goal oriented	1.741
Respect for dignity of work	1.704
Seeks opportunities for job improvements	1.926
Welcomes technological advances	1.741
Respects confidential material	1.259

Fifty percent (5) items in the category received a mean rating of 1.75 or lower. A mean within the range of 1.0 through 1.75 indicated the participants considered the item critical for entry-level employment in

Information Processing. The five items were: High job interest (1.741), Goal oriented (1.741), Respect for dignity of work (1.704), Welcomes technological advances (1.741), and Respects confidential material (1.259). The item, Respects confidential material, received the lowest mean in the major area of General Knowledge. Four items in the category received a mean rating within the range of 1.751 to 2.074. A mean within the range of 1.751 through 2.5 indicated the participants considered the item necessary for entry-level employment in Information Processing. The four items were: Positive self-image (1.815), Future oriented (1.852), Company committed (2.074), and Seeks opportunities for job improvements (1.926).

It was observed that the participants' answers to one item included in "Personal Attitudes of Entry-Level Personnel" resulted in a mean of 2.778. The item was Believes in free enterprise.

Eighty percent (8) of the items in "Personal Attitudes of Entry-Level Personnel" received over 80 percent of the responses as being either critical or necessary. One item, Respects confidential material, received 96.3 percent of the responses as critical or necessary. Three items, High job interest, Goal oriented, and Welcomes technological advances received 88.9 percent of the responses as either critical or necessary. The item, Respects dignity of work, received 88.8 percent of the responses as critical or necessary.

Analyses of responses by company size for the five items which received over 88 percent of the responses as either critical or necessary are displayed in Tables 17 through 21.

The analysis of responses by company size to the item, Respects confidential material, is illustrated in Table 17. Respects confidential material was rated critical by 77.8 percent of the participants and was

rated necessary by 18.5 percent of the participants for a total return of 96.3 percent as either critical or necessary.

TABLE 17

ANALYSIS OF RESPONSES BY COMPANY SIZE

(Respects Confidential Materials)

Companies by Size	Percent of Responses		Company Size Percent Totals
	Critical	Necessary	
500-1000	29.6	7.4	37.0
Over 1000	48.2	11.1	59.3
Totals	77.8	18.5	96.3

Illustrated in Table 18 is the analysis of responses by company size to the item, High job interest. High job interest was rated critical by 37.0 percent of the participants and was rated necessary by 51.9 percent of the participants for a total return of 88.9 percent as either critical or necessary.

TABLE 18

ANALYSIS OF RESPONSES BY COMPANY SIZE

(High Job Interest)

Companies by Size	Percent of Responses		Company Size Percent Totals
	Critical	Necessary	
500-1000	22.2	14.7	37.0
Over 1000	14.8	37.1	51.9
Totals	37.0	51.9	88.9

Illustrated in Table 19 is the analysis of responses by company size to the item, Goal oriented. Goal oriented was rated critical by 37.0 percent of the participants and was rated necessary by 51.9 percent of the participants for a total return of 88.9 percent as either critical or necessary.

TABLE 19

ANALYSIS OF RESPONSES BY COMPANY SIZE

(Goal oriented)

Companies by Size	Percent of Responses		Company Size Percent Totals
	Critical	Necessary	
500-1000	18.5	18.6	37.1
Over 1000	18.5	33.3	51.8
Totals	37.0	51.9	88.9

Illustrated in Table 20 is the analysis of responses by company size to the item, Welcomes technological advances. Welcomes technological advances was rated critical by 37.0 percent of the participants and was rated necessary by 51.9 percent of the participants for a total return of 88.9 percent as either critical or necessary.

Illustrated in Table 21 is the analysis of responses by company size to the item, Respect for dignity of work. Respect for dignity of work was rated critical by 40.7 percent of the participants and was rated necessary by 48.1 percent of the participants for a total return of 88.8 percent as either critical or necessary.

TABLE 20

ANALYSIS OF RESPONSES BY COMPANY SIZE

(Welcomes Technological Advances)

Companies by Size	Percent of Responses		Company Size Percent Totals
	Critical	Necessary	
500-1000	18.5	18.6	37.1
Over 1000	18.5	33.3	51.8
Totals	37.0	51.9	88.9

TABLE 21

ANALYSIS OF RESPONSES BY COMPANY SIZE

(Respect for Dignity of Work)

Companies by Size	Percent of Responses		Company Size Percent Totals
	Critical	Necessary	
500-1000	25.9	7.4	33.3
Over 1000	14.8	40.7	55.5
Totals	40.7	48.1	88.8

Four items included in "Personal Attitudes of Entry-Level Personnel" received over 70 percent of the responses as being either critical or necessary. The four items were: Positive self-image (85.2), Future oriented (81.4), Company committed (70.3), and Seeks opportunities for job improvements (85.2). One item, Believes in free enterprise, received 48.1 percent as critical or necessary. Table 22 contains the percent of

responses received under the response scales of critical, necessary, or possible for the ten items in "Personal Attitudes of Entry-Level Personnel."

TABLE 22

PERSONAL ATTITUDES OF ENTRY-LEVEL PERSONNEL

(Percent of Responses)

Item	Percent		
	Critical	Necessary	Possible
Believes in free enterprise	7.4	40.7	25.9
Positive self-image	33.3	51.9	14.8
High job interest	37.0	51.9	11.1
Future oriented	33.3	48.1	18.5
Company committed	25.9	44.4	25.9
Goal oriented	37.0	51.9	11.1
Respect for dignity of work	40.7	48.1	11.1
Seeks opportunities for job improvements	22.2	63.0	14.8
Welcomes technological advances	37.0	51.9	11.1
Respects confidential material	77.8	18.5	3.7

Personal Traits of Entry-Level Personnel

Ten items were listed under the category, "Personal Traits of Entry-Level Personnel." Ninety percent (9) of the items in the category received a mean rating of 1.778 or lower indicating the items were critical or necessary for entry-level employment in Information Processing.

Included in Table 23 is the listing of all ten items in "Personal Traits of Entry-Level Personnel" with corresponding statistical means.

TABLE 23

PERSONAL TRAITS OF ENTRY-LEVEL PERSONNEL

(Statistical Means)

Item	Mean
Honest	1.481
Diligent	1.667
Conscientious	1.593
Punctual	1.704
Sincere	1.704
Displays initiative	1.704
Logical decision-making	1.481
Emotionally stable	1.667
Self-confident	1.778
Community contributor	3.074

Eighty percent (8) items in the category received a mean rating of 1.75 or lower. A mean within the range of 1.0 to 1.75 indicated the participants considered the item critical for entry-level employment in Information Processing. The eight items were: Honest (1.481), Diligent (1.667), Conscientious (1.593), Punctual (1.704), Sincere (1.704), Displays initiative (1.704), Logical decision-making (1.481), and Emotionally stable (1.667). One item, Self-confident, received a mean rating of 1.778. A mean within the range of 1.751 through 2.5 indicated the participants considered the item necessary for entry-level employment in Information Processing. It was observed that the participants' answers to one item included in "Personal Traits of Entry-Level Personnel" resulted in a mean of 3.074. The item was Community contributor.

Eighty percent (8) of the items in "Personal Traits of Entry-Level Personnel" received over 96 percent of the responses as being either critical or necessary. One item, Punctual, received 100 percent of the responses as being either critical or necessary. The analyses of responses by company size for the eight items which received over 90 percent of the responses as either critical or necessary are displayed in Tables 24 through 31.

Illustrated in Table 24 is the analysis of responses by company size to the item, Punctual. Punctual was rated critical by 29.6 percent of the participants and was rated necessary by 70.4 percent of the participants for a total return of 100 percent as either critical or necessary.

TABLE 24

ANALYSIS OF RESPONSES BY COMPANY SIZE

(Punctual)

Companies by Size	Percent of Responses		Company Size Percent Totals
	Critical	Necessary	
500-1000	22.2	18.5	40.7
Over 1000	7.4	51.9	59.3
Totals	29.6	70.4	100.0

Illustrated in Table 25 is the analysis of responses by company size to the item, Honest. Honest was rated critical by 55.6 percent of the participants and was rated necessary by 40.7 percent of the participants for a total return of 96.3 percent as either critical or necessary.

TABLE 25

ANALYSIS OF RESPONSES BY COMPANY SIZE

(Honest)

Companies by Size	Percent of Responses		Company Size Percent Totals
	Critical	Necessary	
500-1000	29.7	7.4	37.1
Over 1000	25.9	33.3	59.2
Totals	55.6	40.7	96.3

Illustrated in Table 26 is the analysis of responses by company size to the item, Diligent. Diligent was rated critical by 37.0 percent of the participants and was rated necessary by 59.3 percent of the participants for a total return of 96.3 percent as either critical or necessary.

TABLE 26

ANALYSIS OF RESPONSES BY COMPANY SIZE

(Diligent)

Companies by Size	Percent of Responses		Company Size Percent Totals
	Critical	Necessary	
500-1000	29.6	7.4	37.0
Over 1000	7.4	51.9	59.3
Totals	37.0	59.3	96.3

Illustrated in Table 27 is the analysis of responses by company size to the item, Sincere. Sincere was rated critical by 33.3 percent of

the participants and was rated necessary by 63.0 percent for a total return of 96.3 percent as either critical or necessary.

TABLE 27

ANALYSIS OF RESPONSES BY COMPANY SIZE

(Sincere)

Companies by Size	Percent of Responses		Company Size Percent Totals
	Critical	Necessary	
500-1000	22.2	14.8	37.0
Over 1000	11.1	48.2	59.3
Totals	33.3	63.0	96.3

Illustrated in Table 28 is the analysis of responses by company size for the item, Displays initiative. Displays initiative was rated critical by 33.3 percent of the participants and was rated necessary by 63.0 percent for a total return of 96.3 percent as either critical or necessary.

TABLE 28

ANALYSIS OF RESPONSES BY COMPANY SIZE

(Displays Initiative)

Companies by Size	Percent of Responses		Company Size Percent Totals
	Critical	Necessary	
500-1000	14.8	22.3	37.1
Over 1000	18.5	40.7	59.2
Totals	33.3	63.0	96.3

Illustrated in Table 29 is the analysis of responses by company size to the item, Conscientious. Conscientious was rated critical by 44.4 percent of the participants and was rated necessary by 51.9 percent of the participants for a total return of 96.3 percent as either critical or necessary.

TABLE 29

ANALYSIS OF RESPONSES BY COMPANY SIZE

(Conscientious)

Companies by Size	Percent of Responses		Company Size Percent Totals
	Critical	Necessary	
500-1000	25.9	11.2	37.1
Over 1000	18.5	40.7	59.2
Totals	44.4	51.9	96.3

Illustrated in Table 30 is the analysis of responses by company size to the item, Logical decision-making. Logical decision-making was rated critical by 55.6 percent of the participants and was rated necessary by 40.7 percent of the participants for a total return of 96.3 percent as either critical or necessary.

Illustrated in Table 31 is the analysis of responses by company size to the item, Emotionally stable. Emotionally stable was rated critical by 37 percent of the participants and was rated necessary by 59.3 percent of the participants for a total return of 96.3 percent as either critical or necessary.

TABLE 30

ANALYSIS OF RESPONSES BY COMPANY SIZE

(Logical Decision-Making)

Companies by Size	Percent of Responses		Company Size Percent Totals
	Critical	Necessary	
500-1000	25.9	11.1	37.0
Over 1000	29.7	29.6	59.3
Totals	55.6	40.7	96.3

TABLE 31

ANALYSIS OF RESPONSES BY COMPANY SIZE

(Emotionally Stable)

Companies by Size	Percent of Responses		Company Size Percent Totals
	Critical	Necessary	
500-1000	18.5	18.5	37.0
Over 1000	18.5	40.8	59.3
Totals	37.0	59.3	96.3

The item, Self-confident, was rated critical by 33.3 percent of the participants and was rated necessary by 55.6 percent of the participants for a total return of 88.9 percent as either critical or necessary.

It was observed that one item in the category, "Personal Traits of Entry-Level Personnel," received no responses as critical and 29.6 percent rated the item necessary. The item was Community contributor.

Table 32 contains the percent of responses received under the response scales of critical, necessary, or possible for the ten items in "Personal Traits of Entry-Level Personnel."

TABLE 32

PERSONAL TRAITS OF ENTRY-LEVEL PERSONNEL

(Percent of Responses)

Item	Percent		
	Critical	Necessary	Possible
Honest	55.6	40.7	3.7
Diligent	37.0	59.3	3.7
Conscientious	44.4	51.9	3.7
Punctual	29.6	70.4	0.0
Sincere	33.3	63.0	3.7
Displays initiative	33.3	63.0	3.7
Logical decision-making	55.6	40.7	3.7
Emotionally stable	37.0	59.3	3.7
Self-confident	33.3	55.6	11.1
Community contributor	0.0	29.6	40.7

Data Processing

The major area of Data Processing included forty-nine items under three general categories entitled: Starting Personnel Should Be Efficient User Of, Starting Personnel Should Have Knowledge Of, and Starting Personnel Should Know Applications Of. The items listed in this major area relate to basic computer skills. The category, "Starting Personnel Should Be Efficient User Of," relates to input/output peripherals and

computer size. The category, "Starting Personnel Should Have Knowledge Of," relates to computer languages and skills needed by users and decision-makers. The category, "Starting Personnel Should Know Applications Of," relates to different types of computer access.

Starting Personnel Should Be Efficient User Of

Input

Eleven items were listed under the heading, Input, of the category, "Starting Personnel Should Be Efficient User Of." Three items listed under Input received a mean rating of 2.5 or lower indicating the items were critical or necessary for entry-level employment in Information Processing. The items were: Hard disk (2.0), Card (2.407), and Keyboard (1.889).

Eight items listed under Input, of the category, "Starting Personnel Should Be Efficient User Of," received a mean rating of over 3.0. The eight items were: Optical scanners (3.556), Paper tape (3.741), Mag card (3.667), Floppy disk (3.037), Drum (3.037), Voice (3.63), Microfilm (3.222), and Light pen (3.667).

Table 33 includes the listing of all eleven items under Input in the category of, "Starting Personnel Should Be Efficient User Of," with corresponding statistical means.

Three items listed under Input, of the category, "Starting Personnel Should Be Efficient User Of," received over 50 percent of the responses as being either critical or necessary. The items were: Hard disk (85.2), Card (59.3), and Keyboard (92.6).

TABLE 33

STARTING PERSONNEL SHOULD BE EFFICIENT USER OF--INPUT

(Statistical Means)

Item	Mean
Optical scanners	3.556
Paper tape	3.741
Mag card	3.667
Floppy disk	3.037
Hard disk	2.000
Drum	3.037
Card	2.407
Keyboard	1.889
Voice	3.630
Microfilm	3.222
Light pen	3.667

Displayed in Tables 34 through 36 are the analyses of responses by company size to the three items which received over 50 percent of the responses as either critical or necessary.

Illustrated in Table 34 is the analysis of responses by company size to the item, Hard disk. Hard disk was rated critical by 14.8 percent of the participants and was rated necessary by 70.4 percent of the participants for a total return of 85.2 percent as either critical or necessary.

TABLE 34

ANALYSIS OF RESPONSES BY COMPANY SIZE

(Hard Disk)

Companies by Size	Percent of Responses		Company Size Percent Totals
	Critical	Necessary	
500-1000	11.1	22.2	33.3
Over 1000	3.7	48.2	51.9
Totals	14.8	70.4	85.2

Illustrated in Table 35 is the analysis of responses by company size to the item, Keyboard. Keyboard was rated critical by 22.2 percent of the participants and was rated necessary by 70.4 percent of the participants for a total return of 92.6 percent as either critical or necessary.

TABLE 35

ANALYSIS OF RESPONSES BY COMPANY SIZE

(Keyboard)

Companies by Size	Percent of Responses		Company Size Percent Totals
	Critical	Necessary	
500-1000	14.8	25.9	40.7
Over 1000	7.4	44.5	51.9
Totals	22.2	70.4	92.6

Illustrated in Table 36 is the analysis of responses by company size to the item, Card. Card was rated critical by 7.4 percent of the participants and was rated necessary by 51.9 percent for a total return of 59.3 percent as either critical or necessary.

TABLE 36

ANALYSIS OF RESPONSES BY COMPANY SIZE

(Card)

Companies by Size	Percent of Responses		Company Size Percent Totals
	Critical	Necessary	
500-1000	3.7	22.3	26.0
Over 1000	3.7	29.6	33.3
Totals	7.4	51.9	59.3

It was observed from the answers given by the participants that seven of the items under Input, of the category, "Starting Personnel Should Be Efficient User Of," received less than 33.3 percent in the response scales of critical or necessary. The items were: Optical scanners, Paper tape, Mag card, Floppy disk, Voice, Microfilm, and Light pen.

The item, Drum, received 33.3 percent of the responses as either critical or necessary.

Table 37 contains the percent of responses received under the response scales of critical, necessary, or possible for the eleven items listed under Input, of the category, "Starting Personnel Should Be Efficient User Of."

TABLE 37

STARTING PERSONNEL SHOULD BE EFFICIENT USER OF--INPUT

(Percent of Responses)

Item	Percent		
	Critical	Necessary	Possible
Optical scanners	0.0	14.8	18.5
Paper tape	0.0	7.4	11.1
Mag card	0.0	0.0	33.3
Floppy disk	7.4	22.2	29.6
Hard disk	14.8	70.4	14.8
Drum	11.1	22.2	18.5
Card	7.4	51.9	33.3
Keyboard	22.2	70.4	3.7
Voice	3.7	3.7	18.5
Microfilm	0.0	14.8	48.1
Light pen	0.0	3.7	25.9

Output

Seven items were listed under the heading, Output, of the category, "Starting Personnel Should Be Efficient User Of." Two items received a mean rating of 2.0 or lower indicating the items were critical or necessary for entry-level employment in Information Processing. The items were Printed reports (1.852) and Visual display terminal (2.0).

Table 38 includes the listing of all seven items under the heading, Output, of the category, "Starting Personnel Should Be Efficient User Of," with corresponding statistical means.

TABLE 38

STARTING PERSONNEL SHOULD BE
EFFICIENT USER OF--OUTPUT

(Statistical Means)

Item	Mean
Printed reports	1.852
Audio outputs	3.556
Plotted graph	3.111
Microfilm	3.259
Visual display terminal	2.000
Color display terminal	3.444
Microfiche	2.889

Five items under the heading, Output, of the category, "Starting Personnel Should Be Efficient User Of," received a mean rating of 2.5 or higher. The items were: Audio outputs (3.556), Plotted graph (3.111), Microfilm (3.259), Color display terminal (3.444), and Microfiche (2.889).

Two items listed under Output in the category received over 77 percent of the responses as being either critical or necessary. The items were Printed reports and Visual display terminals. Displayed in Tables 39 and 40 are the analyses of responses by company size for the two items which received over 77 percent of the responses as either critical or necessary.

Illustrated in Table 39 is the analysis of responses by company size to the item, Printed reports. Printed reports was rated critical by 18.5 percent of the participants and was rated necessary by 77.8 percent of the participants for a total return of 96.3 percent as critical or necessary.

TABLE 39

ANALYSIS OF RESPONSES BY COMPANY SIZE

(Printed Reports)

Companies by Size	Percent of Responses		Company Size Percent Totals
	Critical	Necessary	
500-1000	11.1	25.9	37.0
Over 1000	7.4	51.9	59.0
Totals	18.5	77.8	96.3

Illustrated in Table 40 is the analysis of responses by company size to the item, Visual display terminal. Visual display terminal was rated critical by 22.2 percent of the participants and was rated necessary by 55.6 of the participants for a total return of 77.8 percent as either critical or necessary.

TABLE 40

ANALYSIS OF RESPONSES BY COMPANY SIZE

(Visual Display Terminal)

Companies by Size	Percent of Responses		Company Size Percent Totals
	Critical	Necessary	
500-1000	11.1	18.5	29.6
Over 1000	11.1	37.1	48.2
Totals	22.2	55.6	77.8

It was observed from the answers given by the participants that five of the items under the heading, Output, of the category, "Starting

Personnel Should Be Efficient User Of," received less than 30 percent in the response scales of critical or necessary. The items were: Audio outputs, Plotted graph, Microfilm, Color display terminal, and Microfiche.

Table 41 contains the percent of responses received under the response scales of critical, necessary, or possible for the seven items under the heading, Output, of the category, "Starting Personnel Should Be Efficient User Of."

TABLE 41

STARTING PERSONNEL SHOULD BE EFFICIENT USER OF--OUTPUT

(Percent of Responses)

Item	Percent		
	Critical	Necessary	Possible
Printed reports	18.5	77.8	3.7
Audio outputs	0.0	7.4	29.6
Plotted graph	0.0	25.9	37.0
Microfilm	0.0	7.4	59.3
Visual display terminal	22.2	55.6	22.2
Color display terminal	0.0	11.1	33.3
Microfiche	7.4	14.8	59.3

Computer Systems

Five items were listed under the heading, Computer Systems, of the category, "Starting Personnel Should Be Efficient User Of." Two of the items received a mean rating within the range of 1.751 to 2.5 which indicated the items were considered necessary by the participants for

entry-level employment in Information Processing. The two items were: Large (2.5) and Mid-size (2.185).

Table 42 includes the listing of all five items under the heading, Computer Systems, of the category, "Starting Personnel Should Be Efficient User Of," with corresponding statistical means.

TABLE 42

STARTING PERSONNEL SHOULD BE EFFICIENT USER OF--
COMPUTER SYSTEMS

(Statistical Means)

Item	Mean
Large	2.500
Mid-size	2.185
Mini	2.778
Microcomputers	3.185
Intelligent terminals	2.778

Three items under Computer Systems received a mean of 2.5 or higher. The items were: Mini (2.778), Microcomputers (3.185), and Intelligent terminals (2.778).

Two items under the heading, Computer Systems, of the category, "Starting Personnel Should Be Efficient User Of," received over 50 percent of the responses as either critical or necessary. Displayed in Tables 43 and 44 are the analysis of responses by company size for the two items which received over 50 percent of the responses as either critical or necessary.

Illustrated in Table 43 is the analysis of responses by company size to the item, Large, under Computer Systems. Large was rated critical by 3.7 percent of the participants and was rated necessary by 51.9 percent of the participants for a total return of 55.6 percent as either critical or necessary.

TABLE 43

ANALYSIS OF RESPONSES BY COMPANY SIZE

(Computer Systems--Large)

Companies by Size	Percent of Responses		Company Size Percent Totals
	Critical	Necessary	
500-1000	3.7	14.8	18.5
Over 1000	0.0	37.1	37.1
Totals	3.7	51.9	55.6

Illustrated in Table 44 is the analysis of responses by company size to the item, Mid-size, under Computer Systems. Mid-size was rated critical by 3.7 percent of the participants and was rated necessary by 74.1 percent of the participants for a total return of 77.8 percent as either critical or necessary.

Table 45 contains the percent of responses received under the response scales of critical, necessary, or possible for the five items under the heading, Computer Systems, in the category, "Starting Personnel Should Be Efficient User Of."

TABLE 44

ANALYSIS OF RESPONSES BY COMPANY SIZE

(Computer Systems--Mid-size)

Companies by Size	Percent of Responses		Company Size Percent Totals
	Critical	Necessary	
500-1000	3.7	25.9	29.6
Over 1000	0.0	48.2	48.2
Totals	3.7	74.1	77.8

TABLE 45

STARTING PERSONNEL SHOULD BE EFFICIENT USER OF--
COMPUTER SYSTEMS

(Percent of Responses)

Item	Percent		
	Critical	Necessary	Possible
Large	3.7	51.9	33.3
Mid-size	3.7	74.1	22.2
Mini	0.0	37.0	48.1
Micro	3.7	7.4	55.6
Intelligent terminals	7.4	22.2	55.6

Starting Personnel Should Have Knowledge Of

Twenty-two items were listed under the category, "Starting Personnel Should Have Knowledge Of." Fifty percent (11) of the items in the category received a mean rating of 2.5 or lower indicating the items were critical or necessary for entry-level employment in Information Processing.

Table 46 includes the listing of all twenty-two items in "Starting Personnel Should Have Knowledge Of" with corresponding statistical means.

TABLE 46

STARTING PERSONNEL SHOULD HAVE KNOWLEDGE OF

(Statistical Means)

Item	Mean
Languages:	
Assembly	2.885
Machine	3.577
COBOL	1.704
BASIC	3.111
PL1	3.308
FORTRAN	3.074
Pascal	3.593
RPG II	3.259
Documentation	1.556
Flowcharting	1.741
Formatting	2.185
Graphics	3.296
Binary coded decimal	2.593
Buffer storage	2.778
Housekeeping	2.037
Library functions	2.111
Structured Programming	2.111
Subroutines	2.074
Desk-top debugging	1.815
Linear programming	3.037
Decision tables	2.481
Data Flow diagrams	2.074

Three items in the category received a mean rating of 1.75 or lower. A mean within the range of 1.0 through 1.75 indicated the participants considered the item critical for entry-level employment in Information Processing. The three items were: Languages--COBOL (1.704), Documentation (1.556), and Flowcharting (1.741).

Eight items in the category received a mean rating within the range of 1.751 through 2.5. A mean within the range of 1.751 through 2.5 indicated the participants considered the item necessary for entry-level employment in Information Processing. The eight items were: Formatting (2.185), Housekeeping (2.037), Library functions (2.111), Structured programming (2.111), Subroutines (2.074), Desk-top debugging (1.815), Decision tables (2.481), and Data Flow diagrams (2.074).

Six of the eight languages listed on the interview-questionnaire received a mean rating of 3.0 or higher. The languages were: Machine (3.577), BASIC (3.111), PL1 (3.308), FORTRAN (3.074), Pascal (3.593), and RPG II (3.259). Assembly received a mean rating of 2.885.

Four items, other than languages, received a mean rating of 2.5 or higher. The four were: Graphics (3.296), Binary coded decimal (2.593), Buffer storage (2.778), and Linear programming (3.037).

Forty-one percent (9) of the items in "Starting Personnel Should Have Knowledge Of" received over 70 percent of the responses as either critical or necessary. Four items received over 88 percent of the responses as either critical or necessary. The four items were: Languages--COBOL (92.5), Documentation (96.2), Flowcharting (92.4), and Desk-top debugging (88.9). Displayed in Tables 47 through 50 are the analyses by company size for the four items which received over 88 percent of the responses as either critical or necessary.

Illustrated in Table 47 is the analysis of responses by company size to the item, Languages--COBOL. Languages--COBOL was rated critical by 44.4 percent of the participants and was rated necessary by 48.1 percent for a total return of 92.5 percent as either critical or necessary.

TABLE 47

ANALYSIS OF RESPONSES BY COMPANY SIZE

(Languages--COBOL)

Companies by Size	Percent of Responses		Company Size Percent Totals
	Critical	Necessary	
500-1000	14.8	18.5	33.3
Over 1000	29.6	29.6	59.2
Totals	44.4	48.1	92.5

Illustrated in Table 48 is the analysis of responses by company size to the item, Documentation. Documentation was rated critical by 48.1 percent of the participants and was rated necessary by 48.1 percent for a total return of 96.2 percent as either critical or necessary.

TABLE 48

ANALYSIS OF RESPONSES BY COMPANY SIZE

(Documentation)

Companies by Size	Percent of Responses		Company Size Percent Totals
	Critical	Necessary	
500-1000	18.5	22.2	40.7
Over 1000	29.6	25.9	55.5
Totals	48.1	48.1	96.2

Illustrated in Table 49 is the analysis of responses by company size to the item, Flowcharting. Flowcharting was rated critical by 33.3 percent of the participants and was rated necessary by 59.1 percent for a total return of 92.4 percent as either critical or necessary.

TABLE 49

ANALYSIS OF RESPONSES BY COMPANY SIZE

(Flowcharting)

Companies by Size	Percent of Responses		Company Size Percent Totals
	Critical	Necessary	
500-1000	14.8	25.8	40.6
Over 1000	18.5	33.3	51.8
Totals	33.3	59.1	92.4

Illustrated in Table 50 is the analysis of responses by company size to the item, Desk-top debugging. Desk-top debugging was rated critical by 29.6 percent of the participants and was rated necessary by 59.3 percent for a total return of 88.9 percent as either critical or necessary.

TABLE 50

ANALYSIS OF RESPONSES BY COMPANY SIZE

(Desk-top Debugging)

Companies by Size	Percent of Responses		Company Size Percent Totals
	Critical	Necessary	
500-1000	11.1	22.3	33.4
Over 1000	18.5	37.0	55.5
Totals	29.6	59.3	88.9

Six items received between 66.6 and 77.8 percent of the responses as either critical or necessary. The items were: Formatting (66.6), Housekeeping (77.8), Library functions (77.8), Structured programming (74.1), Subroutines (74.1), and Data Flow diagrams (70.3). Binary coded decimal received 48.1 percent of the responses and Decision tables received 55.5 percent of the responses as either critical or necessary.

It was observed that ten items (seven of which were languages) received less than 48.1 percent of the responses as critical or necessary. The items under Languages were: Assembly, Machine, BASIC, PL1, FORTRAN, Pascal, and RPG II. The other three items were: Graphics, Buffer storage and Linear Programming.

Table 51 contains the percent of responses received under the response scales of critical, necessary, or possible for the twenty-two items in "Starting Personnel Should Have Knowledge Of."

Starting Personnel Should Know Applications Of

Four items were listed under the category, "Starting Personnel Should Know Applications Of." All four items within the category received a mean rating between 1.889 and 2.333. A mean within the range of 1.751 and 2.5 indicated the participants considered the item necessary for entry-level employment in Information Processing. The items were: Time-sharing (2.333), Batch (1.889), Working inquiry (2.333), and Decision-making (2.185).

Table 52 includes the listing of all four items in "Starting Personnel Should Know Applications Of" with corresponding statistical means.

TABLE 51

STARTING PERSONNEL SHOULD HAVE KNOWLEDGE OF

(Percent of Responses)

Item	Percent		
	Critical	Necessary	Possible
Languages:			
Assembly	7.7	19.2	50.0
Machine	0.0	7.7	26.9
COBOL	44.4	48.1	7.4
BASIC	7.4	11.1	44.4
PL1	0.0	19.2	30.8
FORTRAN	7.4	18.5	33.3
Pascal	0.0	0.0	40.7
RPG II	7.4	3.7	44.4
Documentation	48.1	48.1	3.7
Flowcharting	33.3	59.3	7.4
Formatting	18.5	48.1	29.6
Graphics	0.0	11.1	48.1
Binary coded decimal	7.4	40.7	37.0
Buffer storage	3.7	37.0	37.0
Housekeeping	22.2	55.6	18.5
Library functions	14.8	63.0	18.5
Structured programming	22.2	51.9	18.5
Subroutines	22.2	51.9	22.2
Desk-top debugging	29.6	59.3	11.1
Linear programming	0.0	22.2	51.9
Decision tables	11.1	44.4	29.6
Data Flow diagrams	22.2	48.1	29.6

TABLE 52

STARTING PERSONNEL SHOULD KNOW APPLICATIONS OF

(Statistical Means)

Item	Mean
Time-sharing	2.333
Batch	1.889
Working inquiry	2.333
Decision-making	2.185

All four items in the category, "Starting Personnel Should Know Applications Of," received over 50 percent of the responses as either critical or necessary. One item, Batch, received 92.6 percent of the responses as either critical or necessary.

Illustrated in Table 53 is the analysis of responses by company size to the item, Batch. Batch was rated critical by 22.2 percent of the participants and was rated necessary by 70.4 percent for a total return of 92.6 percent as either critical or necessary.

TABLE 53

ANALYSIS OF RESPONSES BY COMPANY SIZE

(Batch)

Companies by Size	Percent of Responses		Company Size Percent Totals
	Critical	Necessary	
500-1000	11.1	22.2	33.3
Over 1000	11.1	48.2	59.3
Totals	22.2	70.4	92.6

The remaining three items in the category were: Time-sharing (51.8), Working inquiry (55.5), and Decision-making (66.7).

Table 54 contains the percent of responses received under the response scales of critical, necessary, or possible for the four items in "Starting Personnel Should Know Applications Of."

TABLE 54

STARTING PERSONNEL SHOULD KNOW APPLICATIONS OF

(Percent of Responses)

Item	Percent		
	Critical	Necessary	Possible
Time-sharing	22.2	29.6	40.7
Batch	22.2	70.4	3.7
Working inquiry	11.1	44.4	44.4
Decision-making	14.8	51.9	33.3

Electronic Files

The major area of Electronic Files included nineteen items under one general category entitled, "Starting Personnel Should Have Knowledge Of." The items listed in this section represent knowledge needed for entry-level employment in Information Processing which related to company files. The items related to the planning, implementing, retrieving, utilizing, storing, maintaining, and safe-guarding of electronic filing systems.

Fifty-eight percent (11) of the items in the major area of Electronic Files received a mean rating between 1.751 and 2.5. A mean within the range of 1.751 through 2.5 indicated the participants considered the item necessary for entry-level employment in Information Processing.

The eleven items were: File organization (1.76), File--Sequential (1.778), File--Random (1.815), File--Index (1.808), Data base implementation and utilization (2.444), Data file utilization (2.185), File retrieval techniques (2.111), Record protection (2.222), Methods of electronic indexing (2.481), File security (2.037), and File back-up techniques (1.885).

Table 55 includes the listing of all nineteen items in Electronic Files with corresponding statistical means.

TABLE 55

ELECTRONIC FILES

(Statistical Means)

Item	Mean
File organization	1.760
Sequential	1.778
Random	1.815
Index	1.808
Data base, implementation and utilization	2.444
Data file utilization	2.185
Computer output microfilm	3.259
Microfiche	3.077
Micrographics, implementation and utilization	3.444
File retrieval techniques	2.111
Record protection	2.222
Reprographics	3.333
Control cycles	2.778
Cost analysis	2.926
Disposition	2.963
Forms management	2.815
Methods of electronic indexing	2.481
File security	2.037
File back-up techniques	1.885

Four items in the major area of Electronic Files received a mean rating within the range of 2.5 through 3.0. The items were: Control cycles (2.778), Cost analysis (2.926), Disposition (2.963), and Forms management (2.815).

It was observed that the participants' answers to four items resulted in a mean of 3.0 or higher. The items were: Microfiche (3.077), Micrographics, implementation and utilization (3.444), Reprographics (3.333), and Computer output microfilm (3.259).

Nine items in Electronic Files received over 70 percent of the responses as either critical or necessary. Three items received over 90 percent of the responses as either critical or necessary. The three items were: File organization (96.0), Files--Sequential (96.3), and Files--Random (92.6). Displayed in Tables 56 through 58 are the analyses of responses by company size for the three items which received over 90 percent of the responses as either critical or necessary.

Illustrated in Table 56 is the analysis of responses by company size to the item, File organization. File organization was rated critical by 28.0 percent of the participants and was rated necessary by 68.0 percent of the participants for a total return of 96.0 as either critical or necessary.

Illustrated in Table 57 is the analysis of responses by company size to the item, Files--Sequential. Files--Sequential was rated critical by 25.9 percent of the participants and was rated necessary by 70.4 percent of the participants for a total return of 96.3 percent as either critical or necessary.

TABLE 56

ANALYSIS OF RESPONSES BY COMPANY SIZE

(File Organization)

Companies by Size	Percent of Responses		Company Size Percent Totals
	Critical	Necessary	
500-1000	16.0	24.0	40.0
Over 1000	12.0	44.0	56.0
Totals	28.0	68.0	96.0

TABLE 57

ANALYSIS OF RESPONSES BY COMPANY SIZE

(Files--Sequential)

Companies by Size	Percent of Responses		Company Size Percent Totals
	Critical	Necessary	
500-1000	14.8	22.2	37.0
Over 1000	11.1	48.2	59.3
Totals	25.9	70.4	96.3

Illustrated in Table 58 is the analysis of responses by company size to the item, Files--Random. Files--Random was rated critical by 25.9 percent of the participants and was rated necessary by 66.7 percent of the participants for a total return of 92.6 percent as either critical or necessary.

TABLE 58

ANALYSIS OF RESPONSES BY COMPANY SIZE

(Files--Random)

Companies by Size	Percent of Responses		Company Size Percent Totals
	Critical	Necessary	
500-1000	14.8	22.2	37.0
Over 1000	11.1	44.5	55.6
Totals	25.9	66.7	92.6

Eight items received from 50 to 90 percent of the responses as either critical or necessary. The six items were: Files--Index (88.5), Data base, implementation and utilization (55.6), Data file utilization (74.1), File retrieval techniques (81.5), Record protection (66.6), Methods of electronic indexing (59.3), File security (74.0), and File back-up techniques (77.7).

It was observed from the answers given by the participants that eight of the items received less than 50 percent in the response scales of critical or necessary. The eight items were: Computer output microfilm; Microfiche; Micrographics, implementation and utilization; Reprographics; Control cycles; Cost analysis; Disposition; and Forms management.

Table 59 contains the percent of responses received under the response scales of critical, necessary, or possible for the nineteen items in Electronic Files.

TABLE 59

ELECTRONIC FILES

(Percent of Responses)

Item	Percent		
	Critical	Necessary	Possible
File organization	28.0	68.0	4.0
Sequential	25.9	70.4	3.7
Random	25.9	66.7	7.4
Index	30.8	57.7	11.5
Data base, implementation and utilization	3.7	51.9	40.7
Data file utilization	11.1	63.0	22.2
Computer output microfilm	0.0	7.4	59.3
Microfiche	0.0	19.2	53.8
Micrographics, implementation and utilization	0.0	3.7	51.9
File retrieval techniques	14.8	66.7	11.1
Record protection	18.5	48.1	25.9
Reprographics	0.0	14.8	40.7
Control cycles	0.0	37.0	48.1
Cost analysis	7.4	25.9	33.3
Disposition	3.7	14.8	63.0
Forms management	7.4	25.9	44.4
Methods of electronic indexing	7.4	51.9	25.9
File security	25.9	48.1	22.2
File back-up techniques	33.3	44.4	22.2

Telecommunications

The major area of Telecommunications included nineteen items under three general categories entitled: Entry-Level Personnel Should Have Knowledge Of--Data Transmission Terminal Equipment, Entry-Level Personnel Should Have Knowledge Of--Electronic Mail, and Entry-Level Personnel Should Have Knowledge Of--General. The items listed in the section represent skills needed for employment in Information Processing. The items relate to the transmission and receiving of information through telephone, telegraph, and/or microwave facilities.

Entry-Level Personnel Should Have Knowledge Of--Data Transmission Equipment

Nine items were listed under the category, "Entry-Level Personnel Should Have Knowledge Of--Data Transmission Terminal Equipment." One item, Visual display terminals, received a mean rating of 2.111. A mean rating within the range of 1.751 and 2.5 indicated the participants considered the item necessary for entry-level employment in Information Processing.

Table 60 includes the listing of all nine items in the category, "Entry-Level Personnel Should Have Knowledge Of--Data Transmission Terminal Equipment," with corresponding statistical means.

It was observed that the participants' answers to eight items in "Entry-Level Personnel Should Have Knowledge Of--Data Transmission Terminal Equipment" resulted in a mean of 2.5 or higher. The items were: Punched card transmission terminals (3.296), Teledata transmitter-receiver (3.037), Punched tape terminals (3.481), Magnetic tape transmission (2.963), Computer transmission control terminals (2.852), Facsimile terminals (3.333), and Microcomputers as transmitter-receiver (3.037).

TABLE 60

ENTRY-LEVEL PERSONNEL SHOULD HAVE KNOWLEDGE OF--
DATA TRANSMISSION EQUIPMENT

(Statistical Means)

Item	Mean
Visual display terminals	2.111
Punched card transmission terminals	3.296
Teledata transmitter-receiver	3.037
Telespeed tape-to-tape	3.370
Punched tape transmission terminals	3.481
Magnetic tape transmission	2.963
Computer transmission control terminals	2.852
Facsimile terminals	3.333
Microcomputer as transmitter-receiver	3.037

One item in the category, Visual display terminals, received 66.6 percent of the responses as either critical or necessary. Illustrated in Table 61 is the analysis of responses by company size to the item, Visual display terminals. Visual display terminals was rated critical by 25.9 percent of the participants and was rated necessary by 40.7 percent of the participants for a total return of 66.6 percent as either critical or necessary.

It was observed from the answers given by the participants that eight of the items in the category received less than 30 percent in the response scales of critical or necessary. The items were: Punched card transmission terminals, Teledata transmitter-receiver, Telespeed tape-to-tape, Punched tape transmission terminals, Magnetic tape transmission, Computer transmission control terminals, Facsimile terminals, and Microcomputer as transmitter-receiver.

TABLE 61

ANALYSIS OF RESPONSES BY COMPANY SIZE

(Visual Display Terminals)

Companies by Size	Percent of Responses		Company Size Percent Totals
	Critical	Necessary	
500-1000	11.1	7.4	18.5
Over 1000	14.8	33.3	48.1
Totals	25.9	40.7	66.6

Table 62 contains the percent of responses received under the response scales of critical, necessary, or possible for the nine items in "Entry-Level Personnel Should Have Knowledge Of--Data Transmission Equipment."

TABLE 62

ENTRY-LEVEL PERSONNEL SHOULD HAVE KNOWLEDGE OF--
DATA TRANSMISSION EQUIPMENT

(Percent of Responses)

Item	Percent		
	Critical	Necessary	Possible
Visual display terminals	25.9	40.7	29.6
Punched card transmission terminals	0.0	14.8	44.4
Teledata transmitter-receiver	7.4	18.5	40.7
Telespeed tape-to-tape	0.0	11.1	44.4
Punched tape terminals	0.0	3.7	44.4
Magnetic tape transmission	7.4	18.5	44.4
Computer transmission control terminals	3.7	25.9	51.9
Facsimile terminals	0.0	11.1	48.1
Microcomputer as transmitter-receiver	0.0	25.9	44.4

Entry-Level Personnel Should Have Knowledge Of--Electronic Mail

Five items were listed under the category, "Entry-Level Personnel Should Have Knowledge Of--Electronic Mail." Table 63 includes the listing of all five items in the category with corresponding statistical means.

TABLE 63

ENTRY-LEVEL PERSONNEL SHOULD HAVE KNOWLEDGE OF--ELECTRONIC MAIL

(Statistical Means)

Item	Mean
Data communications	2.593
Communicating word processors	2.852
TELEX/TWX	3.111
Facsimile	3.222
Message switching	2.963

It was observed that the participants' answers to all items included in "Entry-Level Personnel Should Have Knowledge Of--Electronic Mail" resulted in a mean of 2.5 or higher. The items were: Data communications (2.593), Communicating word processors (2.852), TELEX/TWX (3.111), Facsimile (3.222), and Message switching (2.963).

All five items in the category, "Entry-Level Personnel Should Have Knowledge Of--Electronic Mail," received less than 41 percent of the responses as either critical or necessary.

Table 64 contains the percent of responses received under the response scales of critical, necessary, or possible for the five items in the category.

TABLE 64

ENTRY-LEVEL PERSONNEL SHOULD HAVE KNOWLEDGE OF--
ELECTRONIC MAIL

(Percent of Responses)

Item	Percent		
	Critical	Necessary	Possible
Data communications	14.8	25.9	44.4
Communicating word processors	7.4	18.5	55.6
TELEX/TWX	0.0	18.5	51.9
Facsimile	0.0	11.1	55.6
Message switching	3.7	22.2	48.1

Entry-Level Personnel Should Have Knowledge Of--General

Five items were listed under the category, "Entry-Level Personnel Should Have Knowledge Of--General." Table 65 includes the listing of all five items in the category with corresponding statistical means.

TABLE 65

ENTRY-LEVEL PERSONNEL SHOULD HAVE KNOWLEDGE OF--
GENERAL

(Statistical Means)

Item	Mean
Centrex	3.370
Teleconferencing	3.185
Remote data processing	2.667
Security	2.515
Data-phone	2.741

It was observed that the participants' answers to all items included in "Entry-Level Personnel Should Have Knowledge Of--General" resulted in a mean of 2.5 or higher. The items were: Centrex (3.370), Teleconferencing (3.185), Remote data processing (2.667), Security (2.515), Data-phone (2.741).

Two items in the category received 44.4 percent of the responses as either critical or necessary. The two items were Security and Data-phone. It was observed from the answers given by the participants that three of the items received less than 40 percent in the response scales of critical or necessary. The items were: Centrex, Teleconferencing, and Remote data processing.

Table 66 contains the percent of responses received under the response scales of critical, necessary, or possible for the five items in "Entry-Level Personnel Should Have Knowledge Of--General."

TABLE 66

ENTRY-LEVEL PERSONNEL SHOULD HAVE KNOWLEDGE OF--GENERAL

(Percent of Responses)

Item	Percent		
	Critical	Necessary	Possible
Centrex	0.0	7.4	51.9
Teleconferencing	3.7	14.8	44.4
Remote data processing	11.1	25.9	48.1
Security	18.5	25.9	40.7
Data-phone	3.7	40.7	33.3

Word Processing

The major area of Word Processing included twenty-three items under three general categories entitled: Entry-Level Personnel Should Be Able To Utilize Materials And/Or Related Sources; Entry-Level Personnel Should Have Knowledge Of; and Company Personnel and Equipment. The items listed under the first two categories relate to skills and/or knowledges needed by entry-level personnel in Information Processing. The third category, "Company Personnel and Equipment" relates to the number of word processing personnel and type of equipment used by the companies.

Entry-Level Personnel Should Be Able To Utilize Materials And/Or Related Sources

Eleven items were listed under the category, "Entry-Level Personnel Should Be Able To Utilize Materials And/Or Related Sources."

Seventy-three percent (8) of the items in the category received a mean rating of 2.5 or lower indicating the items were critical or necessary for entry-level employment in Information Processing. Table 67 includes the listing of all eleven items in the category with corresponding statistical means.

Four items in the category received a mean rating of 1.75 or lower. A mean within the range of 1.0 through 1.75 indicated the participants considered the item critical for entry-level employment in Information Processing. The four items were: Composition skills--Written (1.704), Keyboarding--Accuracy (1.556), Proofreading performance (1.704), and Business English (1.481).

Four items in the category received a mean rating within the range of 1.751 through 2.5. A mean within the range of 1.751 through 2.5 indicated the participants considered the item necessary for

entry-level employment in Information Processing. The four items were: Composition skills--Oral (1.963), Keyboarding--Speed (1.963), Time utilization and organizational ability (1.815), and Form letters (2.481).

TABLE 67

ENTRY-LEVEL PERSONNEL SHOULD BE ABLE TO UTILIZE MATERIALS AND/OR RELATED SOURCES

(Statistical Means)

Item	Mean
Composition skills:	
Oral	1.963
Written	1.704
Keyboarding:	
Speed	1.963
Accuracy	1.556
Proofreading performance	1.704
Time utilization and organizational ability	1.815
Business English	1.481
Form letters	2.481
Alphanumeric sorting	2.519
List processing	2.704
Floppy disk	2.926

It was observed that the participants' answers to three items in "Entry-Level Personnel Should Be Able To Utilize Materials And/Or Related Sources" resulted in a mean of 2.5 or higher. The items were: Alphanumeric sorting (2.519), List processing (2.704), and Floppy disk (2.926).

Sixty-four percent (7) of the items in "Entry-Level Personnel Should Be Able To Utilize Materials And/Or Related Sources" received over 80 percent of the responses as being either critical or necessary. Three items received 100 percent of the responses as either critical or necessary. The items were: Composition skills--Written, Keyboarding--Accuracy, and Business English. One item, Proofreading performance, received 96.3 percent of the responses as either critical or necessary.

Displayed in Tables 68 through 71 are the analyses of responses by company size to the four items which received over 96 percent of the responses as either critical or necessary.

Illustrated in Table 68 is the analysis of responses by company size to the item Composition skills--Written. Composition skills--Written was rated critical by 29.6 percent of the participants and was rated necessary by 70.4 percent of the participants for a total return of 100 percent as either critical or necessary.

TABLE 68

ANALYSIS OF RESPONSES BY COMPANY SIZE

(Composition Skills--Written)

Companies by Size	Percent of Responses		Company Size Percent Totals
	Critical	Necessary	
500-1000	18.5	22.2	40.7
Over 1000	11.1	48.2	59.3
Totals	29.6	70.4	100.0

Illustrated in Table 69 is the analysis of responses by company size to the item, Keyboarding--Accuracy. Keyboarding--Accuracy was rated critical by 44.4 percent of the participants and was rated necessary by 55.6 percent of the participants for a total return of 100 percent as either critical or necessary.

TABLE 69

ANALYSIS OF RESPONSES BY COMPANY SIZE

(Keyboarding--Accuracy)

Companies by Size	Percent of Responses		Company Size Percent Totals
	Critical	Necessary	
500-1000	25.9	14.8	40.7
Over 1000	18.5	40.8	59.3
Totals	44.4	55.6	100.0

Illustrated in Table 70 is the analysis of responses by company size to the item, Business English. Business English was rated critical by 51.9 percent of the participants and was rated necessary by 48.1 percent for a total return of 100 percent as either critical or necessary.

TABLE 70

ANALYSIS OF RESPONSES BY COMPANY SIZE

(Business English)

Companies by Size	Percent of Responses		Company Size Percent Totals
	Critical	Necessary	
500-1000	33.3	7.4	40.7
Over 1000	18.6	40.7	59.3
Totals	51.9	48.1	100.0

Illustrated in Table 71 is the analysis of responses by company size to the item, Proofreading performance. Proofreading performance was rated critical by 33.3 percent of the participants and was rated necessary by 63.0 percent of the participants for a total return of 96.3 percent as either critical or necessary.

TABLE 71

ANALYSIS OF RESPONSES BY COMPANY SIZE

(Proofreading Performance)

Companies by Size	Percent of Responses		Company Size Percent Totals
	Critical	Necessary	
500-1000	18.5	22.2	40.7
Over 1000	14.8	40.8	55.6
Totals	33.3	63.0	96.3

Three items in the category, "Entry-Level Personnel Should Be Able To Utilize Materials And/Or Related Sources," received between 80 percent and 85.2 percent of the responses as either critical or necessary. The items were: Composition skills--Oral (81.5), Keyboarding--Speed (81.5), and Time utilization and organizational ability (85.2). The item, Form letters, received 48.1 percent of the responses as either critical or necessary.

It was observed from the answers given by the participants that three of the items received less than 45 percent in the response scales of critical or necessary. The items were: Alphanumeric sorting (44.4), List processing (37.0), and Floppy disk (29.6).

Table 72 contains the percent of responses received under the response scales of critical, necessary, or possible for the eleven items in "Entry-Level Personnel Should Be Able To Utilize Materials And/Or Related Sources."

TABLE 72

ENTRY-LEVEL PERSONNEL SHOULD BE ABLE TO UTILIZE MATERIALS AND/OR RELATED SOURCES

(Percent of Responses)

Item	Percent		
	Critical	Necessary	Possible
Composition skills:			
Oral	25.9	55.6	14.8
Written	29.6	70.4	0.0
Keyboarding:			
Speed	22.2	59.3	18.5
Accuracy	44.4	55.6	0.0
Proofreading performance	33.3	63.0	3.7
Time utilization and organizational ability	33.3	51.9	14.8
Business English	51.9	48.1	0.0
Form letters	11.1	37.0	44.4
Alphanumeric sorting	7.4	37.0	51.9
List processing	7.4	29.6	48.1
Floppy disk	7.4	22.2	44.4

Entry-Level Personnel Should Have Knowledge Of

Nine items were listed under the category, "Entry-Level Personnel Should Have Knowledge Of." Table 73 includes the listing of all nine items with corresponding statistical means.

TABLE 73

ENTRY-LEVEL PERSONNEL SHOULD HAVE KNOWLEDGE OF

(Statistical Means)

Item	Mean
Formatting and editing	2.255
Justification	2.667
Machine transcription	2.704
Split keyboarding	2.926
Intelligent copiers	3.148
Shared-logic word processors	3.148
Stand-alone processors	2.593
Administrative activities	2.481
Mag card	2.885

Two items in the category received a mean rating between 1.751 and 2.5. A mean within the range of 1.751 and 2.5 indicated the participants considered the item necessary for entry-level employment in Information Processing. The items were Formatting and editing (2.255) and Administrative activities (2.481).

It was observed that the participants' answers to seven items included in "Entry-Level Personnel Should Have Knowledge Of" resulted in

a mean of 2.5 or higher. The items were: Justification (2.667), Machine transcription (2.704), Split keyboarding (2.926), Intelligent copiers (3.148), Shared-logic word processors (3.148), Stand-alone processors (2.593), and Mag card (2.885).

One item, Formatting and editing, received 74.1 percent of the responses as either critical or necessary. Four items received between 40 percent and 48.1 percent of the responses as either critical or necessary. The items were: Justification (44.4), Machine transcription (40.7), Stand-alone processors (48.1), and Administrative activities (48.1).

It was observed from the answers given by the participants that four of the items in "Entry-Level Personnel Should Have Knowledge Of" received less than 40 percent in the response scales of critical or necessary. The four items were: Split keyboarding, Intelligent copiers, Shared-logic word processors, and Mag card.

Table 74 contains the percent of responses received under the response scales of critical, necessary, or possible for the nine items in "Entry-Level Personnel Should Have Knowledge Of."

TABLE 74

ENTRY-LEVEL PERSONNEL SHOULD HAVE KNOWLEDGE OF

(Percent of Responses)

Item	Percent		
	Critical	Necessary	Possible
Formatting and editing	7.4	66.7	18.5
Justification	3.7	40.7	40.7
Machine transcription	7.4	33.3	44.4
Split keyboarding	7.4	18.5	51.9

TABLE 74--Continued

Item	Percent		
	Critical	Necessary	Possible
Intelligent copiers	0.0	14.8	59.3
Shared-logic word processors	3.7	14.8	48.1
Stand-alone processors	7.4	40.7	37.0
Administrative activities	7.4	40.7	48.1
Mag card	0.0	29.6	51.9

Company Personnel and Equipment

Three items were listed under "Company Personnel and Equipment." The participants responded to the item, Average number of personnel in word processing, and the tabulated results are presented in Table 75.

TABLE 75

AVERAGE NUMBER OF PERSONNEL IN WORD PROCESSING

Percent of Companies	Number of Personnel
29.6	1-05
25.9	6-10
22.2	10-15
11.1	16-20
7.4	26-30
3.7	30-Plus

The participants responded to the items, Stand-alone word processors and Shared-logic word processors by indicating whether the company was utilizing the type of equipment.

Of the companies with 500 to 1000 employees, 81.8 percent responded the organization utilized Stand-alone word processors. Of the companies with over 1000 employees, 87.5 percent responded the organization utilized Stand-alone word processors.

Of the companies with 500 to 1000 employees, 18.2 percent responded the organization utilized Shared-logic word processors. Of the companies with over 1000 employees, 31.3 responded the organization utilized Shared-logic word processors.

Demographic Factors

The major area, Demographic Factors, included four items. The items were to ascertain the type of company responding, the number of employees in the company, the approximate number of data processing personnel, and whether the participants had a company-sponsored training program.

Twenty-seven companies were interviewed, of which eleven had 500 to 1000 employees and sixteen had over 1000 employees.

The types of companies interviewed were: Manufacturers (6), Banks (3), Wholesale (3), Hospitals (3), Transportation (2), Retail (3), Insurance (3), and Energy (4).

The participants answered the item, Approximate number of data processing personnel, and the responses are summarized in Table 76.

Of the companies with 500 to 1000 employees, 90.9 percent responded that the organization utilized a Company-sponsored training

program. Of the companies with over 1000 employees, 68.8 percent responded that the organization utilized a Company-sponsored training program.

TABLE 76

APPROXIMATE NUMBER OF DATA PROCESSING PERSONNEL

Percent of Companies	Number of Personnel
7.4	1-10
29.6	11-25
18.5	26-50
11.1	51-75
7.4	76-100
25.9	Over 100

Summary

The purpose of Chapter IV was to report the analyses of the data collected for the 166 items listed on the interview-questionnaire. The interview-questionnaire was the basis for the interviews conducted with selected officials of companies with over 500 employees and located in the Oklahoma City Metropolitan Area.

An analyses of the data have been presented to illustrate the participating companies responses to the characteristics and skills needed for entry-level employment in Information Processing. Major areas, general categories, and items were presented in the same order as listed on the interview-questionnaire.

The analyses of 160 items were displayed by statistical means as well as the percent of responses under the response scales of critical,

necessary, or possible. Items receiving an extreme percent of responses for the category as either critical or necessary were analyzed according to company size--companies with 500 to 1000 employees and companies with over 1000 employees.

Information concerning demographic factors of the companies which were interviewed was reported for four items.

CHAPTER V

SUMMARY

Introduction

In Chapter V, a summation of the statements and findings of Chapters I through IV are presented. Chapter V is divided into four sections. In the section, Problem, the basic problem is reviewed. In the section, Procedure, the methodology used in the research is briefly cited. In the section, Findings, the analyses of the collected data are summarized; and in the section, Recommendations for Further Study, recommendations are listed which materialized during either the collection process or after analyses of the interview-questionnaire had been completed.

Problem

This study analyzes and evaluates work characteristics and skills deemed necessary by managers in business and industry to secure employment and to succeed in the area of Information Processing.

Procedures

An extensive search of related literature was made using dissertations, journals, magazines, speech abstracts from national conferences of associations related to the field of Information Processing, books, and personal interviews.

A pilot study was conducted utilizing personal interviews. Revisions of the interview-questionnaire were made based on the information gained during the pilot study interviews.

The population consisted of the major employers (those with 500 or more employees) in the Oklahoma City Metropolitan Area as listed in the "Statistical Abstract of Oklahoma 1980."[1] The study was limited to the companies which were computer-based within the State of Oklahoma. Personnel in twenty-seven companies were interviewed with the number of people being interviewed per company determined by the number of information processing departments and the number of people in the departments whom the managers believed would be beneficial to the study.

One hundred and sixty-six items were coded and keypunched; then statistics compiled through the use of computer programs, Condescriptive and Crosstabs from the Statistical Package for the Social Sciences.[2]

The Condescriptive program computed the statistical mean on a five-point scale. Percents of responses were illustrated through the Crosstabs program.

Six items relating to demographic factors of the companies were tabulated for additional background information concerning the population.

Findings

General Knowledge

Of the fifty-two items listed under the major area of General Knowledge, the participants considered nineteen critical for entry-level

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[1]Dikeman.

[2]Hie, pp. 185-247.

employment in Information Processing. The items deemed critical were: Computation skills--General math; Communication skills--Oral, speaking; Communication skills--Oral, Listening; Willing to assume responsibility; Team-worker; Effective use of time; High-job interest; Goal oriented; Respect for dignity of work; Welcomes technological advances; Respects confidential material; Honest; Diligent; Conscientious; Punctual; Displays initiative; Logical decision-making; Emotionally stable; and Sincere.

Of the fifty-two items listed under General Knowledge, the participants considered twenty-two necessary for entry-level employment in Information Processing. The items deemed necessary were: Basic tools of information systems analyst; Information system's development concept; Computation skills--Algebra; Computation skills--Numbering systems; Communication skills--Written, Letters; Communication skills--Written, Reports; Basic office skills--Typewriting; Vocabulary--General business; Vocabulary--Accounting; Vocabulary--Computer; Competitive aspect of business; Work ethics; Critical role of information; Effective use of materials and supplies; Calm under pressure; Pleasant under adverse conditions; Good work-area organization; Positive self-image; Future oriented; Company committed; Seeks opportunities for job improvements; and Self-confident.

Although not receiving as high a mean rating, several items in this category received as high a percent of responses under the response scale of critical or necessary as did the items with mean ratings of critical. The items were: Vocabulary--Computer, Effective use of materials and supplies, Calm under pressure, Seeks opportunities for job improvements, and Self-confident.

Data Processing

The participants considered entry-level employees should be efficient users of three types of input media--keyboard, card, and hard disk. The three items were considered necessary for entry-level employees in the Oklahoma City Metropolitan Area. The participants considered entry-level employees should be efficient users of two types of output media--printed reports and visual display terminals. The two items were considered necessary for entry-level employment in the Oklahoma City Metropolitan Area. Efficient use of large and mid-size computers was rated necessary by the participants.

One programming language was rated as necessary by all respondents in the study. COBOL was considered critical by the participants for entry-level employment in Information Processing. One participant added the term "job control" to the space allowed for other entries at the end of the category. Two participants stated a unique language had been compiled for the particular problems of their companies.

Documentation and flowcharting received ratings of critical for knowledge needed by starting personnel in Information Processing. Under the same category, Formatting, Housekeeping, Library functions, Structured programming, Subroutines, Desk-top debugging, Decision tables, and Data Flow diagrams were considered necessary for starting personnel in Information Processing in the Oklahoma City Metropolitan Area.

The participants considered that starting personnel should know applications of Time-sharing, Batch, Working inquiry, and Decision-making. The four items were considered necessary for entry-level personnel in Information Processing.

Electronic Files

The participants believed it was necessary for starting personnel to have knowledge of File organization, Sequential filing, Random filing, Index filing, Data base implementation and utilization, Data file utilization, File retrievel techniques, Record protection, Methods of electronic indexing, File security, and File back-up techniques. The eleven items were all considered necessary for starting personnel in Information Processing in the Oklahoma City Metropolitan Area.

Word Processing

The major area of Word Processing contained twenty-three items. Twenty of the items related to skills needed by entry-level personnel in Information Processing, and three items related to the number of employees and type of equipment used in the participating companies.

The participants considered four of the items critical for entry-level employment in Information Processing. The four items were: Composition skills--Written, Keyboarding--Accuracy, Proofreading performance, and Business English.

Four items were considered necessary for entry-level personnel to be able to utilize materials and/or related sources. The four items were: Keyboarding--Speed, Time utilization and organizational ability, Form letters, and Composition skills--Oral. The participants considered it to be necessary for entry-level personnel to have knowledge of two items: Formatting and editing, and Administrative activities.

A large percent of the participating companies stated stand-alone word processors were utilized by their companies--81.8 percent of the companies with 500 to 1000 employees and 87.5 percent of the companies with over 1000 employees. Shared-logic word processors were

utilized by the remaining 18.2 percent of the companies with 500 to 1000 employees. The companies with over 1000 employees responded with 31.3 percent using shared-logic word processors indicating some of the larger companies used both stand-alone and shared-logic word processors. Several of the companies were conducting feasibility studies on integrating word processors with the mainframe computer within the company.

Approximately 30 percent of the companies stated the average number of personnel employed by the company for word processing ranged from one to five and 25.9 percent stated the average number of personnel ranged from six to ten. Another 22.2 percent stated the average number of personnel for the company was ten to fifteen. Three companies used the services of from sixteen to twenty word processing operators, two companies used twenty-six to thirty, and one company stated the average was over thirty employees.

Demographic Factors

Twenty-seven companies were interviewed of which eleven had 500 to 1000 employees and sixteen had over 1000 employees. Approximately one-third averaged over 100 employees in data processing with 29.6 percent reporting the average number between 11 and 25. Eighteen and one-half percent stated the average for their companies were 26 to 50 employees in data processing. Three companies employed 51 to 75 people, and two companies used 76 to 100 employees in data processing. Two companies employed 1 to 10 people as an average in data processing.

The smaller companies with 500 to 1000 employees responded with 90.9 percent utilizing a company-sponsored training program; whereas, the larger companies of over 1000 employees responded with 68.8 percent utilizing a company-sponsored training program.

Recommendations For Further Study

This study was limited to the Oklahoma City Metropolitan Area. A study should be conducted in other large metropolitan areas to ascertain whether the reported work characteristics would remain constant in different geographical locations.

This study was limited to companies of 500 or more employees which were listed in the "Statistical Abstract of Oklahoma 1980."[1] A study should be conducted using smaller companies as the population to determine whether the reported work characteristics would remain constant in companies of different personnel sizes.

The findings in this study were limited to the fall of 1980 and the spring of 1981. A university teacher stated he had to re-earn his Ph.D. every three years in the computer field because of new technological advances.[2] Studies in Information Processing should be continuous because of the constant changes and expansion within the field.

Due to the limitations of this study--only companies of over 500 employees in the Oklahoma City Metropolitan Area were interviewed--the items which received a mean rating of over 2.5 should be reviewed for possible use in smaller companies within the same area and for possible use by companies, both large and small, in different localities. The items which should be reviewed are presented in the following paragraphs.

General Knowledge. Eleven of the fifty-two items listed under the major heading of General Knowledge should be reviewed for possible use by smaller companies or by companies in different localities. The items

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[1]Dikeman.

[2]"Implications of Survey Results To Managers of DP Instructors," Computing Newsletter 13 (February 1981):8.

were: Computational skills--Boolean algebra; Economic literacy; Community contributer; Business cycles; Individual's contribution to society; Increased role of government in production and distribution; Basic office skills--Office machines; Basic office skills--Bookkeeping; Basic office skills--Transcription; Needs, sources and use of money; and Believes in free enterprise.

Data Processing. Input media which should be reviewed are Optical scanners, Paper tape, Mag card, Floppy disk, Drum, Voice, Microfilm, and Light pen. Output media for review are Audio reports, Plotted graph, Microfilm, Color display terminal, and Microfiche. Minicomputers, Microcomputers, and Intelligent terminals should be reviewed for present day need in smaller companies and different geographical locations, and for future need in the same area due to the speed with which the items are invading the marketplace. Smaller companies or different localities may use languages other than COBOL. Other languages to be reviewed are Assembly, Machine, BASIC, PL1, FORTRAN, Pascal, and RPG II. Other items in the major heading of Data Processing which should be reviewed are Binary coded decimal, Graphics, and Linear programming.

Electronic Files. The items which received a mean rating of over 2.5 in Electronic Files related to peripheral use of files and concepts of knowledge. The items which should be reviewed for a need by smaller companies or for use in different localities are Computer output microfilm; Microfiche; Micrographics implementation and utilization; Reprographics; Control cycles; Cost analysis; Disposition; and Forms management.

Telecommunications. Telecommunications is a new technology and the area needs to be reviewed for need by smaller companies, for need in

different geographical locations, and for need by large Oklahoma City companies in the future.

Word Processing. Items under the major area of Word Processing which should be reviewed for use in smaller companies and different geographic locations are Alphanumeric sorting, List processing, Floppy disk, Justification, Machine transcription, Split keyboarding, Intelligent copiers, Shared-logic word processors, Stand-alone word processors, and Mag card.

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APPENDICES

APPENDIX A

PERCENT OF RESPONSES TO CHARACTERISTICS

BY COMPANY SIZE

TABLE 77

ANALYSIS OF RESPONSES BY COMPANY SIZE

(Basic Tools of Information Systems Analyst)

Number of Employees	Responses					
	Critical	Necessary	Possible	Unnecessary	Uncertain	Row Total
500-1000	1 3.8	1 3.8	7 26.9	1 3.8	0 0.0	10 38.5
Over 1000	2 7.7	11 42.3	1 3.8	1 3.8	1 3.8	16 61.5
Column Total	3 11.5	12 46.2	8 30.8	2 7.7	1 3.8	26 100.0

Chi Square = 13.50104 with 4 degrees of freedom Significance = 0.0091

TABLE 78

ANALYSIS OF RESPONSES BY COMPANY SIZE

(Information System's Development Concept)

Number of Employees	Responses					
	Critical	Necessary	Possible	Unnecessary	Uncertain	Row Total
500-1000	1 4.2	3 12.5	6 25.0	0 0.0	. . . .	10 41.7
Over 1000	1 4.2	10 41.7	2 8.3	1 4.2	. . . .	14 58.3
Column Total	2 8.3	13 54.2	8 33.3	1 4.2	. . . .	24 100.0

Chi Square = 6.27692 with 3 degrees of freedom Significance = 0.0989

TABLE 79

ANALYSIS OF RESPONSES BY COMPANY SIZE

(Computation Skills: General Math)

Number of Employees	Responses					
	Critical	Necessary	Possible	Unnecessary	Uncertain	Row Total
500-1000	5 18.5	5 18.5	1 3.7	. . . .	. . . .	11 40.7
Over 1000	4 14.8	12 44.4	0 0.0	. . . .	. . . .	16 59.3
Column Total	9 33.3	17 63.0	1 3.7	. . . .	. . . .	27 100.0

Chi Square = 3.17647 with 2 degrees of freedom Significance = 0.2043

TABLE 80

ANALYSIS OF RESPONSES BY COMPANY SIZE

(Computation Skills: Algebra)

Number of Employees	Responses					
	Critical	Necessary	Possible	Unnecessary	Uncertain	Row Total
500-1000	2 7.4	3 11.1	5 18.5	1 3.7	. . . .	11 40.7
Over 1000	1 3.7	9 33.3	5 18.5	1 3.7	. . . .	16 59.3
Column Total	3 11.1	12 44.4	10 37.0	2 7.4	. . . .	27 100.0

Chi Square = 2.49290 with 3 degrees of freedom Significance = 0.4766

TABLE 81

ANALYSIS OF RESPONSES BY COMPANY SIZE

(Computation Skills: Boolean Algebra)

Number of Employees	Responses					
	Critical	Necessary	Possible	Unnecessary	Uncertain	Row Total
500-1000	1 3.7	1 3.7	4 14.8	5 18.5	. . . .	11 40.7
Over 1000	1 3.7	3 11.1	7 25.9	5 18.5	. . . .	16 59.3
Column Total	2 7.4	4 14.8	11 40.7	10 37.0	. . . .	27 100.0

Chi Square = 0.92394 with 3 degrees of freedom Significance = 0.8196

TABLE 82

ANALYSIS OF RESPONSES BY COMPANY SIZE

(Computation Skills: Numbering Systems)

Number of Employees	Responses					
	Critical	Necessary	Possible	Unnecessary	Uncertain	Row Total
500-1000	3 11.1	1 3.7	5 18.5	2 7.4	. . . .	11 40.7
Over 1000	1 3.7	8 29.6	7 25.9	0 0.0	. . . .	16 59.3
Column Total	4 14.8	9 33.3	12 44.4	2 7.4	. . . .	27 100.0

Chi Square = 8.13067 with 3 degrees of freedom Significance = 0.0434

TABLE 83

ANALYSIS OF RESPONSES BY COMPANY SIZE

(Communication Skills: Speaking)

Number of Employees	Responses					
	Critical	Necessary	Possible	Unnecessary	Uncertain	Row Total
500-1000	4 14.8	6 22.2	1 3.7	. . . .	. . . .	11 40.7
Over 1000	6 22.2	9 33.3	1 3.7	. . . .	. . . .	16 59.3
Column Total	10 37.0	15 55.6	2 7.4	. . . .	. . . .	27 100.0

Chi Square = 0.07670 with 2 degrees of freedom Significance = 0.9624

TABLE 84

ANALYSIS OF RESPONSES BY COMPANY SIZE

(Communication Skills: Listening)

Number of Employees	Responses					
	Critical	Necessary	Possible	Unnecessary	Uncertain	Row Total
500-1000	7 25.9	4 14.8	. . . .	. . . .	. . . .	11 40.7
Over 1000	12 44.4	4 14.8	. . . .	. . . .	. . . .	16 59.3
Column Total	19 70.4	8 29.6	. . . .	. . . .	. . . .	27 100.0

Chi Square = .04264 with 1 degrees of freedom Significance = .8364

TABLE 85

ANALYSIS OF RESPONSES BY COMPANY SIZE

(Communication Skills: Letters)

Number of Employees	Responses					
	Critical	Necessary	Possible	Unnecessary	Uncertain	Row Total
500-1000	3 11.1	4 14.8	3 11.1	1 3.7	. . . .	11 40.7
Over 1000	3 11.1	12 44.4	1 3.7	0 0.0	. . . .	16 59.3
Column Total	6 22.2	16 59.3	4 14.8	1 3.7	. . . .	27 100.0

Chi Square = 5.25426 with 3 degrees of freedom Significance = 0.1541

TABLE 86

ANALYSIS OF RESPONSES BY COMPANY SIZE

(Communication Skills: Reports)

Number of Employees	Responses					
	Critical	Necessary	Possible	Unnecessary	Uncertain	Row Total
500-1000	5 18.5	3 11.1	2 7.4	1 3.7	. . . .	11 40.7
Over 1000	3 11.1	11 40.7	2 7.4	0 0.0	. . . .	16 59.3
Column Total	8 29.6	14 51.9	4 14.8	1 3.7	. . . .	27 100.0

Chi Square = 5.32822 with 3 degrees of freedom Significance = 0.1493

TABLE 87

ANALYSIS OF RESPONSES BY COMPANY SIZE

(Basic Office Skills: Typewriting)

Number of Employees	Responses					
	Critical	Necessary	Possible	Unnecessary	Uncertain	Row Total
500-1000	3 11.1	6 22.2	2 7.4	0 0.0	. . . .	11 40.7
Over 1000	1 3.7	11 40.7	1 3.7	3 11.1	. . . .	16 59.3
Column Total	4 14.8	17 63.0	3 11.1	3 11.1	. . . .	27 100.0

Chi Square = 5.05122 with 3 degrees of freedom Significance = 0.1681

TABLE 88

ANALYSIS OF RESPONSES BY COMPANY SIZE

(Basic Office Skills: Office Machines)

Number of Employees	Responses					
	Critical	Necessary	Possible	Unnecessary	Uncertain	Row Total
500-1000	6 22.2	4 14.8	1 3.7	. . . .	. . . .	11 40.7
Over 1000	3 11.1	5 18.5	8 29.6	. . . .	. . . .	16 59.3
Column Total	9 33.3	9 33.3	9 33.3	. . . .	. . . .	27 100.0

Chi Square = 5.82954 with 2 degrees of freedom Significance = 0.0542

TABLE 89

ANALYSIS OF RESPONSES BY COMPANY SIZE

(Basic Office Skills: Bookkeeping)

Number of Employees	Responses					
	Critical	Necessary	Possible	Unnecessary	Uncertain	Row Total
500-1000	. .	5	3	3	. .	11
	. .	18.5	11.1	11.1	. .	40.7
Over 1000	. .	8	4	4	. .	16
	. .	29.6	14.8	14.8	. .	59.3
Column	. .	13	7	7	. .	27
Total	. .	48.1	25.9	25.9	. .	100.0

Chi Square = 0.05395 with 2 degrees of freedom Significance = 0.9734

TABLE 90

ANALYSIS OF RESPONSES BY COMPANY SIZE

(Basic Office Skills: Transcription)

Number of Employees	Responses					
	Critical	Necessary	Possible	Unnecessary	Uncertain	Row Total
500-1000	. .	4	7	0	. .	11
	. .	14.8	25.9	0.0	. .	40.7
Over 1000	. .	4	6	6	. .	16
	. .	14.8	22.2	22.2	. .	59.3
Column	. .	8	13	6	. .	27
Total	. .	29.6	48.1	22.2	. .	100.0

Chi Square = 5.33391 with 2 degrees of freedom Significance = 0.0695

TABLE 91

ANALYSIS OF RESPONSES BY COMPANY SIZE

(Vocabulary: General Business)

Number of Employees	Responses					
	Critical	Necessary	Possible	Unnecessary	Uncertain	Row Total
500-1000	3 11.1	6 22.2	1 3.7	1 3.7	. . . .	11 40.7
Over 1000	1 3.7	10 37.0	5 18.5	0 0.0	. . . .	16 59.3
Column Total	4 14.8	16 59.3	6 22.2	1 3.7	. . . .	27 100.0

Chi Square = 4.90909 with 3 degrees of freedom Significance = 0.1786

TABLE 92

ANALYSIS OF RESPONSES BY COMPANY SIZE

(Vocabulary: Accounting)

Number of Employees	Responses					
	Critical	Necessary	Possible	Unnecessary	Uncertain	Row Total
500-1000	2 7.4	6 22.2	2 7.4	1 3.7	. . . .	11 40.7
Over 1000	2 7.4	9 33.3	5 18.5	0 0.0	. . . .	16 59.3
Column Total	4 14.8	15 55.6	7 25.9	1 3.7	. . . .	27 100.0

Chi Square = 2.02938 with 3 degrees of freedom Significance = 0.5663

TABLE 93

ANALYSIS OF RESPONSES BY COMPANY SIZE

(Vocabulary: Computer)

Number of Employees	Responses					
	Critical	Necessary	Possible	Unnecessary	Uncertain	Row Total
500-1000	4 14.8	6 22.2	1 3.7	. . . .	. . . .	11 40.7
Over 1000	4 14.8	11 40.7	1 3.7	. . . .	. . . .	16 59.3
Column Total	8 29.6	17 63.0	2 7.4	. . . .	. . . .	27 100.0

Chi Square = 0.56400 with 2 degrees of freedom Significance = 0.7543

TABLE 94

ANALYSIS OF RESPONSES BY COMPANY SIZE

(Business Cycles)

Number of Employees	Responses					
	Critical	Necessary	Possible	Unnecessary	Uncertain	Row Total
500-1000	1 3.7	2 7.4	7 25.9	1 3.7	. . . .	11 40.7
Over 1000	1 3.7	4 14.8	9 33.3	2 7.4	. . . .	16 59.3
Column Total	2 7.4	6 22.2	16 59.3	3 11.1	. . . .	27 100.0

Chi Square = 0.33558 with 3 degrees of freedom Significance = 0.9532

TABLE 95

ANALYSIS OF RESPONSES BY COMPANY SIZE

(Economic Literacy)

Number of Employees	Responses					
	Critical	Necessary	Possible	Unnecessary	Uncertain	Row Total
500-1000	. . . .	2 7.4	6 22.2	3 11.1	0 0.0	11 40.7
Over 1000	. . . .	3 11.1	10 37.0	2 7.4	1 3.7	16 59.3
Column Total	. . . .	5 18.5	16 59.3	5 18.5	1 3.7	27 100.0

Chi Square = 1.52642 with 3 degrees of freedom Significance = 0.6762

TABLE 96

ANALYSIS OF RESPONSES BY COMPANY SIZE

(Competitive Aspect of Business)

Number of Employees	Responses					
	Critical	Necessary	Possible	Unnecessary	Uncertain	Row Total
500-1000	1 3.7	5 18.5	1 3.7	4 14.8	. . . .	11 40.7
Over 1000	2 7.4	6 22.2	6 22.2	2 7.4	. . . .	16 59.3
Column Total	3 11.1	11 40.7	7 25.9	6 22.2	. . . .	27 100.0

Chi Square = 3.86909 with 3 degrees of freedom Significance = 0.2760

TABLE 97

ANALYSIS OF RESPONSES BY COMPANY SIZE

(Individual's Productivity as Contribution to Society)

Number of Employees	Responses					
	Critical	Necessary	Possible	Unnecessary	Uncertain	Row Total
500-1000	3 11.1	3 11.1	3 11.1	2 7.4	. . . .	11 40.7
Over 1000	1 3.7	5 18.5	6 22.2	4 14.8	. . . .	16 59.3
Column Total	4 14.8	8 29.6	9 33.3	6 22.2	. . . .	27 100.0

Chi Square = 2.32031 with 3 degrees of freedom Significance = 0.5086

TABLE 98

ANALYSIS OF RESPONSES BY COMPANY SIZE

(Critical Role of Information)

Number of Employees	Responses					
	Critical	Necessary	Possible	Unnecessary	Uncertain	Row Total
500-1000	1 3.7	6 22.2	4 14.8	0 0.0	. . . .	11 40.7
Over 1000	4 14.8	9 33.3	1 3.7	2 7.4	. . . .	16 59.3
Column Total	5 18.5	15 55.6	5 18.5	2 7.4	. . . .	27 100.0

Chi Square = 5.46136 with 3 degrees of freedom Significance = 0.1410

TABLE 99

ANALYSIS OF RESPONSES BY COMPANY SIZE

(Needs, Sources, and Use of Money)

Number of Employees	Responses					
	Critical	Necessary	Possible	Unnecessary	Uncertain	Row Total
500-1000	1 3.7	2 7.4	7 25.9	1 3.7	0 0.0	11 40.7
Over 1000	1 3.7	4 14.8	6 22.2	4 14.8	1 3.7	16 59.3
Column Total	2 7.4	6 22.2	13 48.1	5 18.5	1 3.7	27 100.0

Chi Square = 2.71062 with 4 degrees of freedom Significance = 0.6074

TABLE 100

ANALYSIS OF RESPONSES BY COMPANY SIZE

(Work Ethics)

Number of Employees	Responses					
	Critical	Necessary	Possible	Unnecessary	Uncertain	Row Total
500-1000	5 18.5	3 11.1	3 11.1	. . . .	0 0.0	11 40.7
Over 1000	4 14.8	9 33.3	2 7.4	. . . .	1 3.7	16 59.3
Column Total	9 33.3	12 44.4	5 18.5	. . . .	1 3.7	27 100.0

Chi Square = 3.50539 with 3 degrees of freedom Significance = 0.3201

TABLE 101

ANALYSIS OF RESPONSES BY COMPANY SIZE

(Increased Role of Government in Production and Distribution)

Number of Employees	Responses					
	Critical	Necessary	Possible	Unnecessary	Uncertain	Row Total
500-1000	0 0.0	2 7.4	3 11.1	5 18.5	1 3.7	11 40.7
Over 1000	1 3.7	1 3.7	9 33.3	5 18.5	0 0.0	16 59.3
Column Total	1 3.7	3 11.1	12 44.4	10 37.0	1 3.7	27 100.0

Chi Square = 4.56392 with 4 degrees of freedom Significance = 0.3350

TABLE 102

ANALYSIS OF RESPONSES BY COMPANY SIZE

(Effective Use of Materials and Supplies)

Number of Employees	Responses					
	Critical	Necessary	Possible	Unnecessary	Uncertain	Row Total
500-1000	2 7.4	9 33.3	0 0.0	0 0.0	. . . .	11 40.7
Over 1000	1 3.7	12 44.4	2 7.4	1 3.7	. . . .	16 59.3
Column Total	3 11.1	21 77.8	2 7.4	1 3.7	. . . .	27 100.0

Chi Square = 2.93669 with 3 degrees of freedom Significance = 0.4015

TABLE 103

ANALYSIS OF RESPONSES BY COMPANY SIZE

(Willing to Assume Responsibility)

Number of Employees	Responses					
	Critical	Necessary	Possible	Unnecessary	Uncertain	Row Total
500-1000	6 22.2	5 18.5	0 0.0	. . . .	. . . .	11 40.7
Over 1000	6 22.2	8 29.6	2 7.4	. . . .	. . . .	16 59.3
Column Total	12 44.4	13 48.1	2 7.4	. . . .	. . . .	27 100.0

Chi Square = 1.82911 with 2 degrees of freedom Significance = 0.4007

TABLE 104

ANALYSIS OF RESPONSES BY COMPANY SIZE

(Team-Worker)

Number of Employees	Responses					
	Critical	Necessary	Possible	Unnecessary	Uncertain	Row Total
500-1000	7 25.9	4 14.8	0 0.0	. . . .	. . . .	11 40.7
Over 1000	6 22.2	9 33.3	1 3.7	. . . .	. . . .	16 59.3
Column Total	13 48.1	13 48.1	1 3.7	. . . .	. . . .	27 100.0

Chi Square = 2.14773 with 2 degrees of freedom Significance = 0.3417

TABLE 105

ANALYSIS OF RESPONSES BY COMPANY SIZE

(Effective Use of Time)

Number of Employees	Responses					
	Critical	Necessary	Possible	Unnecessary	Uncertain	Row Total
500-1000	6 22.2	5 18.5	. . . .	. . . .	. . . .	11 40.7
Over 1000	6 22.2	10 37.0	. . . .	. . . .	. . . .	16 59.3
Column Total	12 44.4	15 55.6	. . . .	. . . .	. . . .	27 100.0

Chi Square = 0.23203 with 1 degree of freedom Significance = 0.6300

TABLE 106

ANALYSIS OF RESPONSES BY COMPANY SIZE

(Calm Under Pressure)

Number of Employees	Responses					
	Critical	Necessary	Possible	Unnecessary	Uncertain	Row Total
500-1000	7 25.9	3 11.1	1 3.7	. . . .	. . . .	11 40.7
Over 1000	2 7.4	12 44.4	2 7.4	. . . .	. . . .	16 59.3
Column Total	9 33.3	15 55.6	3 11.1	. . . .	. . . .	27 100.0

Chi Square = 7.85454 with 2 degrees of freedom Significance = 0.0197

TABLE 107

ANALYSIS OF RESPONSES BY COMPANY SIZE

(Pleasant Under Adverse Conditions)

Number of Employees	Responses					
	Critical	Necessary	Possible	Unnecessary	Uncertain	Row Total
500-1000	4 14.8	7 25.9	0 0.0	. . . .	. . . .	11 40.7
Over 1000	0 0.0	10 37.0	6 22.2	. . . .	. . . .	16 59.3
Column Total	4 14.8	17 63.0	6 22.2	. . . .	. . . .	27 100.0

Chi Square = 9.94452 with 2 degrees of freedom Significance = 0.0069

TABLE 108

ANALYSIS OF RESPONSES BY COMPANY SIZE

(Good Work-Area Organization)

Number of Employees	Responses					
	Critical	Necessary	Possible	Unnecessary	Uncertain	Row Total
500-1000	3 11.1	6 22.2	2 7.4	. . . .	. . . .	11 40.7
Over 1000	2 7.4	9 33.3	5 18.5	. . . .	. . . .	16 59.3
Column Total	5 18.5	15 55.6	7 25.9	. . . .	. . . .	27 100.0

Chi Square = 1.20097 with 2 degrees of freedom Significance = 0.5485

TABLE 109

ANALYSIS OF RESPONSES BY COMPANY SIZE

(Believes in Free Enterprise)

Number of Employees	Responses					
	Critical	Necessary	Possible	Unnecessary	Uncertain	Row Total
500-1000	2 7.4	3 11.1	2 7.4	2 7.4	2 7.4	11 40.7
Over 1000	0 0.0	8 29.6	5 18.5	3 11.1	0 0.0	16 59.3
Column Total	2 7.4	11 40.7	7 25.9	5 18.5	2 7.4	27 100.0

Chi Square = 7.07514 with 4 degrees of freedom Significance = 0.1320

TABLE 110

ANALYSIS OF RESPONSES BY COMPANY SIZE

(Positive Self-Image)

Number of Employees	Responses					
	Critical	Necessary	Possible	Unnecessary	Uncertain	Row Total
500-1000	4 14.8	6 22.2	1 3.7	. . . .	. . . .	11 40.7
Over 1000	5 18.5	8 29.6	3 11.1	. . . .	. . . .	16 59.3
Column Total	9 33.3	14 51.9	4 14.8	. . . .	. . . .	27 100.0

Chi Square = 0.48762 with 2 degrees of freedom Significance = 0.7836

TABLE 111

ANALYSIS OF RESPONSES BY COMPANY SIZE

(High Job Interest)

Number of Employees	Responses					
	Critical	Necessary	Possible	Unnecessary	Uncertain	Row Total
500-1000	6 22.2	4 14.8	1 3.7	. . . .	. . . .	11 40.7
Over 1000	4 14.8	10 37.0	2 7.4	. . . .	. . . .	16 59.3
Column Total	10 37.0	14 51.9	3 11.1	. . . .	. . . .	27 100.0

Chi Square = 2.46331 with 2 degrees of freedom Significance = 0.2918

TABLE 112

ANALYSIS OF RESPONSES BY COMPANY SIZE

(Future Oriented)

Number of Employees	Responses					
	Critical	Necessary	Possible	Unnecessary	Uncertain	Row Total
500-1000	5 18.5	4 14.8	2 7.4	. . . .	. . . .	11 40.7
Over 1000	4 14.8	9 33.3	3 11.1	. . . .	. . . .	16 59.3
Column Total	9 33.3	13 48.1	5 18.5	. . . .	. . . .	27 100.0

Chi Square = 1.35472 with 2 degrees of freedom Significance = 0.5080

TABLE 113

ANALYSIS OF RESPONSES BY COMPANY SIZE

(Company Committed)

Number of Employees	Responses					
	Critical	Necessary	Possible	Unnecessary	Uncertain	Row Total
500-1000	5 18.5	3 11.1	3 11.1	0 0.0	. . . .	11 40.7
Over 1000	2 7.4	9 33.3	4 14.8	1 3.7	. . . .	16 100.0
Column Total	7 25.9	12 44.4	7 25.9	1 3.7	. . . .	27 100.0

Chi Square = 4.66254 with 3 degrees of freedom Significance = 0.1982

TABLE 114

ANALYSIS OF RESPONSES BY COMPANY SIZE

(Goal Oriented)

Number of Employees	Responses					
	Critical	Necessary	Possible	Unnecessary	Uncertain	Row Total
500-1000	5 18.5	5 18.5	1 3.7	. . . .	. . . .	11 40.7
Over 1000	5 18.5	9 33.3	2 7.4	. . . .	. . . .	16 59.3
Column Total	10 37.0	14 51.9	3 11.1	. . . .	. . . .	27 100.0

Chi Square = 0.56980 with 2 degrees of freedom Significance = 0.7521

TABLE 115

ANALYSIS OF RESPONSES BY COMPANY SIZE

(Respect for Dignity of Work)

Number of Employees	Responses					
	Critical	Necessary	Possible	Unnecessary	Uncertain	Row Total
500-1000	7 25.9	2 7.4	2 7.4	. . . .	. . . .	11 40.7
Over 1000	4 14.8	11 40.7	1 3.7	. . . .	. . . .	16 59.3
Column Total	11 40.7	13 48.1	3 11.1	. . . .	. . . .	27 100.0

Chi Square = 6.68563 with 2 degrees of freedom Significance = 0.0353

TABLE 116

ANALYSIS OF RESPONSES BY COMPANY SIZE

(Seeks Opportunities for Job Improvements)

Number of Employees	Responses					
	Critical	Necessary	Possible	Unnecessary	Uncertain	Row Total
500-1000	3 11.1	7 25.9	1 3.7	. . . .	. . . .	11 40.7
Over 1000	3 11.1	10 37.0	3 11.1	. . . .	. . . .	16 59.3
Column Total	6 22.2	17 63.0	4 14.8	. . . .	. . . .	27 100.0

Chi Square = 0.62492 with 2 degrees of freedom Significance = 0.7316

TABLE 117

ANALYSIS OF RESPONSES BY COMPANY SIZE

(Welcomes Technological Advances)

Number of Employees	Responses					
	Critical	Necessary	Possible	Unnecessary	Uncertain	Row Total
500-1000	5 18.5	5 18.5	1 3.7	. . . .	. . . .	11 40.7
Over 1000	5 18.5	9 33.3	2 7.4	. . . .	. . . .	16 59.3
Column Total	10 37.0	14 51.9	3 11.1	. . . .	. . . .	27 100.0

Chi Square = 0.56980 with 2 degrees of freedom Significance = 0.7521

TABLE 118

ANALYSIS OF RESPONSES BY COMPANY SIZE

(Respects Confidential Material)

Number of Employees	Responses					
	Critical	Necessary	Possible	Unnecessary	Uncertain	Row Total
500-1000	8 29.6	2 7.4	1 3.7	. . . .	. . . .	11 40.7
Over 1000	13 48.1	3 11.1	0 0.0	. . . .	. . . .	16 59.3
Column Total	21 77.8	5 18.5	1 3.7	. . . .	. . . .	27 100.0

Chi Square = 1.51656 with 2 degrees of freedom Significance = 0.4685

TABLE 119

ANALYSIS OF RESPONSES BY COMPANY SIZE

(Honest)

Number of Employees	Responses					
	Critical	Necessary	Possible	Unnecessary	Uncertain	Row Total
500-1000	8 29.6	2 7.4	1 3.7	. . . .	. . . .	11 40.7
Over 1000	7 25.9	9 33.3	0 0.0	. . . .	. . . .	16 59.3
Column Total	15 55.6	11 40.7	1 3.7	. . . .	. . . .	27 100.0

Chi Square = 4.75847 with 2 degrees of freedom Significance = 0.0926

TABLE 120

ANALYSIS OF RESPONSES BY COMPANY SIZE

(Diligent)

Number of Employees	Responses					
	Critical	Necessary	Possible	Unnecessary	Uncertain	Row Total
500-1000	8 29.6	2 7.4	1 3.7	. . . .	. . . .	11 40.7
Over 1000	2 7.4	14 51.9	0 0.0	. . . .	. . . .	16 59.3
Column Total	10 37.0	16 59.3	1 3.7	. . . .	. . . .	27 100.0

Chi Square = 13.12414 with 2 degrees of freedom Significance = 0.0014

TABLE 121

ANALYSIS OF RESPONSES BY COMPANY SIZE

(Conscientious)

Number of Employees	Responses					
	Critical	Necessary	Possible	Unnecessary	Uncertain	Row Total
500-1000	7 25.9	3 11.1	1 3.7	. . . .	. . . .	11 40.7
Over 1000	5 18.5	11 40.7	0 0.0	. . . .	. . . .	16 59.3
Column Total	12 44.4	14 51.9	1 3.7	. . . .	. . . .	27 100.0

Chi Square = 5.15564 with 2 degrees of freedom Significance = 0.0759

TABLE 122

ANALYSIS OF RESPONSES BY COMPANY SIZE

(Punctual)

Number of Employees	Responses					
	Critical	Necessary	Possible	Unnecessary	Uncertain	Row Total
500-1000	6 22.2	5 18.5	. . . .	. . . .	. . . .	11 40.7
Over 1000	2 7.4	14 51.9	. . . .	. . . .	. . . .	16 59.3
Column Total	8 29.6	19 70.4	. . . .	. . . .	. . . .	27 100.0

Chi Square = 3.69418 with 1 degrees of freedom Significance = 0.0546

TABLE 123

ANALYSIS OF RESPONSES BY COMPANY SIZE

(Sincere)

Number of Employees	Responses					
	Critical	Necessary	Possible	Unnecessary	Uncertain	Row Total
500-1000	6 22.2	4 14.8	1 3.7	. . . .	. . . .	11 40.7
Over 1000	3 11.1	13 48.1	0 0.0	. . . .	. . . .	16 59.3
Column Total	9 33.3	17 63.0	1 3.7	. . . .	. . . .	27 100.0

Chi Square = 6.04612 with 2 degrees of freedom Significance = 0.0487

TABLE 124

ANALYSIS OF RESPONSES BY COMPANY SIZE

(Displays Initiative)

Number of Employees	Responses					
	Critical	Necessary	Possible	Unnecessary	Uncertain	Row Total
500-1000	4 14.8	6 22.2	1 3.7	. . . .	. . . .	11 40.7
Over 1000	5 18.5	11 40.7	0 0.0	. . . .	. . . .	16 59.3
Column Total	9 33.3	17 63.0	1 3.7	. . . .	. . . .	27 100.0

Chi Square = 1.71457 with 2 degrees of freedom Significance = 0.4243

TABLE 125

ANALYSIS OF RESPONSES BY COMPANY SIZE

(Logical Decision-Making)

Number of Employees	Responses					
	Critical	Necessary	Possible	Unnecessary	Uncertain	Row Total
500-1000	7 25.9	3 11.1	1 3.7	. . . .	. . . .	11 40.7
Over 1000	8 29.6	8 29.6	0 0.0	. . . .	. . . .	16 59.3
Column Total	15 55.6	11 40.7	1 3.7	. . . .	. . . .	27 100.0

Chi Square = 2.49917 with 2 degrees of freedom Significance = 0.2866

TABLE 126

ANALYSIS OF RESPONSES BY COMPANY SIZE

(Emotionally Stable)

Number of Employees	Responses					
	Critical	Necessary	Possible	Unnecessary	Uncertain	Row Total
500-1000	5 18.5	5 18.5	1 3.7	. . . .	. . . .	11 40.7
Over 1000	5 18.5	11 40.7	0 0.0	. . . .	. . . .	16 59.3
Column Total	10 37.0	16 59.3	1 3.7	. . . .	. . . .	27 100.0

Chi Square = 2.40660 with 2 degrees of freedom Significance = 0.3002

TABLE 127

ANALYSIS OF RESPONSES BY COMPANY SIZE

(Self-Confident)

Number of Employees	Responses					
	Critical	Necessary	Possible	Unnecessary	Uncertain	Row Total
500-1000	5 18.5	4 14.8	2 7.4	. . . .	. . . .	11 40.7
Over 1000	4 14.8	11 40.7	1 3.7	. . . .	. . . .	16 59.3
Column Total	9 33.3	15 55.6	3 11.1	. . . .	. . . .	27 100.0

Chi Square = 2.88409 with 2 degrees of freedom Significance = 0.2364

TABLE 128

ANALYSIS OF RESPONSES BY COMPANY SIZE

(Community Contributor)

Number of Employees	Responses					
	Critical	Necessary	Possible	Unnecessary	Uncertain	Row Total
500-1000	. . . .	4 14.8	4 14.8	1 3.7	2 7.4	11 40.7
Over 1000	. . . .	4 14.8	7 25.9	5 18.5	0 0.0	16 59.3
Column Total	. . . .	8 29.6	11 40.7	6 22.2	2 7.4	27 100.0

Chi Square = 4.72081 with 3 degrees of freedom Significance = 0.1934

TABLE 129

ANALYSIS OF RESPONSES BY COMPANY SIZE

(Input: Optical Scanners)

Number of Employees	Responses					
	Critical	Necessary	Possible	Unnecessary	Uncertain	Row Total
500-1000	. .	1	0	9	1	11
	. .	3.7	0.0	33.3	3.7	40.7
Over 1000	. .	3	5	8	0	16
	. .	11.1	18.5	29.6	0.0	59.3
Column Total	. .	4	5	17	1	27
	. .	14.8	18.5	63.0	3.7	100.0

Chi Square = 6.35068 with 3 degrees of freedom Significance = 0.0957

TABLE 130

ANALYSIS OF RESPONSES BY COMPANY SIZE

(Input: Paper Tape)

Number of Employees	Responses					
	Critical	Necessary	Possible	Unnecessary	Uncertain	Row Total
500-1000	. .	2	0	9	. .	11
	. .	7.4	0.0	33.3	. .	40.7
Over 1000	. .	0	3	13	. .	16
	. .	0.0	11.1	48.1	. .	59.3
Column Total	. .	2	3	22	. .	27
	. .	7.4	11.1	81.5	. .	100.0

Chi Square = 4.97184 with 2 degrees of freedom Significance = 0.0832

TABLE 131

ANALYSIS OF RESPONSES BY COMPANY SIZE

(Input: Mag Card)

Number of Employees	Responses					
	Critical	Necessary	Possible	Unnecessary	Uncertain	Row Total
500-1000	. .	. .	3	8	. .	11
	. .	. .	11.1	29.6	. .	40.7
Over 1000	. .	. .	6	10	. .	16
	. .	. .	22.2	37.0	. .	59.3
Column Total	. .	. .	9	18	. .	27
	. .	. .	33.3	66.7	. .	100.0

Chi Square = 0.01918 with 1 degrees of freedom Significance = 0.8899

TABLE 132

ANALYSIS OF RESPONSES BY COMPANY SIZE

(Input: Floppy Disk)

Number of Employees	Responses					
	Critical	Necessary	Possible	Unnecessary	Uncertain	Row Total
500-1000	1	0	4	6	. .	11
	3.7	0.0	14.8	22.2	. .	40.7
Over 1000	1	6	4	5	. .	16
	3.7	22.2	14.8	18.5	. .	59.3
Column Total	2	6	8	11	. .	27
	7.4	22.2	29.6	40.7	. .	100.0

Chi Square = 5.34839 with 3 degrees of freedom Significance = 0.1480

TABLE 133

ANALYSIS OF RESPONSES BY COMPANY SIZE

(Input: Hard Disk)

Number of Employees	Responses					
	Critical	Necessary	Possible	Unnecessary	Uncertain	Row Total
500-1000	3 11.1	6 22.2	2 7.4	. . . .	. . . .	11 40.7
Over 1000	1 3.7	13 48.1	2 7.4	. . . .	. . . .	16 59.3
Column Total	4 14.8	19 70.4	4 14.8	. . . .	. . . .	27 100.0

Chi Square = 2.74723 with 2 degrees of freedom Significance = 0.2532

TABLE 134

ANALYSIS OF RESPONSES BY COMPANY SIZE

(Input: Drum)

Number of Employees	Responses					
	Critical	Necessary	Possible	Unnecessary	Uncertain	Row Total
500-1000	2 7.4	4 14.8	2 7.4	3 11.1	. . . .	11 40.7
Over 1000	1 3.7	2 7.4	3 11.1	10 37.0	. . . .	16 59.3
Column Total	3 11.1	6 22.2	5 18.5	13 48.1	. . . .	27 100.0

Chi Square = 4.18689 with 3 degrees of freedom Significance = 0.2420

TABLE 135

ANALYSIS OF RESPONSES BY COMPANY SIZE

(Input: Card)

Number of Employees	Responses					
	Critical	Necessary	Possible	Unnecessary	Uncertain	Row Total
500-1000	1 3.7	6 22.2	3 11.1	1 3.7	. . . .	11 40.7
Over 1000	1 3.7	8 29.6	6 22.2	1 3.7	. . . .	16 59.3
Column Total	2 7.4	14 51.9	9 33.3	2 7.4	. . . .	27 100.0

Chi Square = 0.37256 with 3 degrees of freedom Significance = 0.9458

TABLE 136

ANALYSIS OF RESPONSES BY COMPANY SIZE

(Input: Keyboard)

Number of Employees	Responses					
	Critical	Necessary	Possible	Unnecessary	Uncertain	Row Total
500-1000	4 14.8	7 25.9	0 0.0	0 0.0	. . . .	11 40.7
Over 1000	2 7.4	12 44.4	1 3.7	1 3.7	. . . .	16 59.3
Column Total	6 22.2	19 70.4	1 3.7	1 3.7	. . . .	27 100.0

Chi Square = 3.16507 with 3 degrees of freedom Significance = 0.3669

TABLE 137

ANALYSIS OF RESPONSES BY COMPANY SIZE

(Input: Voice)

Number of Employees	Responses					
	Critical	Necessary	Possible	Unnecessary	Uncertain	Row Total
500-1000	1 3.7	0 0.0	0 0.0	10 37.0	. . . .	11 40.7
Over 1000	0 0.0	1 3.7	5 18.5	10 37.0	. . . .	16 59.3
Column Total	1 3.7	1 3.7	5 18.5	20 74.1	. . . .	27 100.0

Chi Square = 6.28977 with 3 degrees of freedom Significance = 0.0983

TABLE 138

ANALYSIS OF RESPONSES BY COMPANY SIZE

(Input: Microfilm)

Number of Employees	Responses					
	Critical	Necessary	Possible	Unnecessary	Uncertain	Row Total
500-1000	. . . .	1 3.7	6 22.2	4 14.8	. . . .	11 40.7
Over 1000	. . . .	3 11.1	7 25.9	6 22.2	. . . .	16 59.3
Column Total	. . . .	4 14.8	13 48.1	10 37.0	. . . .	27 100.0

Chi Square = 0.57056 with 2 degrees of freedom Significance = 0.7518

TABLE 139

ANALYSIS OF RESPONSES BY COMPANY SIZE

(Input: Light Pen)

Number of Employees	Responses					
	Critical	Necessary	Possible	Unnecessary	Uncertain	Row Total
500-1000	. .	0	2	9	. .	11
	. .	0.0	7.4	33.3	. .	40.7
Over 1000	. .	1	5	10	. .	16
	. .	3.7	18.5	37.0	. .	59.3
Column	. .	1	7	19	. .	27
Total	. .	3.7	25.9	70.4	. .	100.0

Chi Square = 1.46257 with 2 degrees of freedom Significance = 0.4813

TABLE 140

ANALYSIS OF RESPONSES BY COMPANY SIZE

(Output: Printed Reports)

Number of Employees	Responses					
	Critical	Necessary	Possible	Unnecessary	Uncertain	Row Total
500-1000	3	7	1	. .	. .	11
	11.1	25.9	3.7	. .	. .	40.7
Over 1000	2	14	0	. .	. .	16
	7.4	51.9	0.0	. .	. .	59.3
Column	5	21	1	. .	. .	27
Total	18.5	77.8	3.7	. .	. .	100.0

Chi Square = 2.70000 with 2 degrees of freedom Significance = 0.2592

TABLE 141

ANALYSIS OF RESPONSES BY COMPANY SIZE

(Output: Audio Outputs)

Number of Employees	Responses					
	Critical	Necessary	Possible	Unnecessary	Uncertain	Row Total
500-1000	. .	1	1	9	. .	11
	. .	3.7	3.7	33.3	. .	40.7
Over 1000	. .	1	7	8	. .	16
	. .	3.7	25.9	29.6	. .	59.3
Column	. .	2	8	17	. .	27
Total	. .	7.4	29.6	63.0	. .	100.0

Chi Square = 3.76190 with 2 degrees of freedom Significance = 0.1524

TABLE 142

ANALYSIS OF RESPONSES BY COMPANY SIZE

(Output: Plotted Graph)

Number of Employees	Responses					
	Critical	Necessary	Possible	Unnecessary	Uncertain	Row Total
500-1000	. .	2	5	4	. .	11
	. .	7.4	18.5	14.8	. .	40.7
Over 1000	. .	5	5	6	. .	16
	. .	18.5	18.5	22.2	. .	59.3
Column	. .	7	10	10	. .	27
Total	. .	25.9	37.0	37.0	. .	100.0

Chi Square = 0.78677 with 2 degrees of freedom Significance = 0.6748

TABLE 143

ANALYSIS OF RESPONSES BY COMPANY SIZE

(Output: Microfilm)

Number of Employees	Responses					
	Critical	Necessary	Possible	Unnecessary	Uncertain	Row Total
500-1000	. .	0	7	4	. .	11
	. .	0.0	25.9	14.8	. .	40.7
Over 1000	. .	2	9	5	. .	16
	. .	7.4	33.3	18.5	. .	59.3
Column	. .	2	16	9	. .	27
Total	. .	7.4	59.3	33.3	. .	100.0

Chi Square = 1.48615 with 2 degrees of freedom Significance = 0.4756

TABLE 144

ANALYSIS OF RESPONSES BY COMPANY SIZE

(Output: Visual Display Terminal)

Number of Employees	Responses					
	Critical	Necessary	Possible	Unnecessary	Uncertain	Row Total
500-1000	3	5	3	. .	. .	11
	11.1	18.5	11.1	. .	. .	40.7
Over 1000	3	10	3	. .	. .	16
	11.1	37.0	11.1	. .	. .	59.3
Column	6	15	6	. .	. .	27
Total	22.2	55.6	22.2	. .	. .	100.0

Chi Square = 0.76705 with 2 degrees of freedom Significance = 0.6815

TABLE 145

ANALYSIS OF RESPONSES BY COMPANY SIZE

(Output: Color Display Terminal)

Number of Employees	Responses					
	Critical	Necessary	Possible	Unnecessary	Uncertain	Row Total
500-1000	. .	0	4	7	. .	11
	. .	0.0	14.8	25.9	. .	40.7
Over 1000	. .	3	5	8	. .	16
	. .	11.1	18.5	29.6	. .	59.3
Column	. .	3	9	15	. .	27
Total	. .	11.1	33.3	55.6	. .	100.0

Chi Square = 2.33181 with 2 degrees of freedom Significance = 0.3116

TABLE 146

ANALYSIS OF RESPONSES BY COMPANY SIZE

(Output: Microfiche)

Number of Employees	Responses					
	Critical	Necessary	Possible	Unnecessary	Uncertain	Row Total
500-1000	1	2	7	1	. .	11
	3.7	7.4	25.9	3.7	. .	40.7
Over 1000	1	2	9	4	. .	16
	3.7	7.4	33.3	14.8	. .	59.3
Column	2	4	16	5	. .	27
Total	7.4	14.8	59.3	18.5	. .	100.0

Chi Square = 1.16399 with 3 degrees of freedom Significance = 0.7617

TABLE 147

ANALYSIS OF RESPONSES BY COMPANY SIZE

(Computer Systems: Large)

Number of Employees	Responses					
	Critical	Necessary	Possible	Unnecessary	Uncertain	Row Total
500-1000	1 3.7	4 14.8	5 18.5	1 3.7	. . . .	11 40.7
Over 1000	0 0.0	10 37.0	4 14.8	2 7.4	. . . .	16 59.3
Column Total	1 3.7	14 51.9	9 33.3	3 11.1	. . . .	27 100.0

Chi Square = 3.19967 with 3 degrees of freedom Significance = 0.3619

TABLE 148

ANALYSIS OF RESPONSES BY COMPANY SIZE

(Computer Systems: Mid-Size)

Number of Employees	Responses					
	Critical	Necessary	Possible	Unnecessary	Uncertain	Row Total
500-1000	1 3.7	7 25.9	3 11.1	. . . .	. . . .	11 40.7
Over 1000	0 0.0	13 48.1	3 11.1	. . . .	. . . .	16 59.3
Column Total	1 3.7	20 74.1	6 22.2	. . . .	. . . .	27 100.0

Chi Square = 1.94062 with 2 degrees of freedom Significance = 0.3790

TABLE 149

ANALYSIS OF RESPONSES BY COMPANY SIZE

(Computer Systems: Mini)

Number of Employees	Responses					
	Critical	Necessary	Possible	Unnecessary	Uncertain	Row Total
500-1000	. .	2	7	2	. .	11
	. .	7.4	25.9	7.4	. .	40.7
Over 1000	. .	8	6	2	. .	16
	. .	29.6	22.2	7.4	. .	59.3
Column	. .	10	13	4	. .	27
Total	. .	37.0	48.1	14.8	. .	100.0

Chi Square = 2.84869 with 2 degrees of freedom Significance = 0.2407

TABLE 150

ANALYSIS OF RESPONSES BY COMPANY SIZE

(Computer Systems: Microcomputers)

Number of Employees	Responses					
	Critical	Necessary	Possible	Unnecessary	Uncertain	Row Total
500-1000	0	1	6	4	. .	11
	0.0	3.7	22.2	14.8	. .	40.7
Over 1000	1	1	9	5	. .	16
	3.7	3.7	33.3	18.5	. .	59.3
Column	1	2	15	9	. .	27
Total	3.7	7.4	55.6	33.3	. .	100.0

Chi Square = 0.81307 with 3 degrees of freedom Significance = 0.8463

TABLE 151

ANALYSIS OF RESPONSES BY COMPANY SIZE

(Computer Systems: Intelligent Terminals)

Number of Employees	Responses					
	Critical	Necessary	Possible	Unnecessary	Uncertain	Row Total
500-1000	1 3.7	3 11.1	4 14.8	3 11.1	. . . .	11 40.7
Over 1000	1 3.7	3 11.1	11 40.7	1 3.7	. . . .	16 59.3
Column Total	2 7.4	6 22.2	15 55.6	4 14.8	. . . .	27 100.0

Chi Square = 3.45937 with 3 degrees of freedom Significance = 0.3261

TABLE 152

ANALYSIS OF RESPONSES BY COMPANY SIZE

(Languages: Assembly)

Number of Employees	Responses					
	Critical	Necessary	Possible	Unnecessary	Uncertain	Row Total
500-1000	1 3.8	3 11.5	4 15.4	3 11.5	. . . .	11 42.3
Over 1000	1 3.8	2 7.7	9 34.6	3 11.5	. . . .	15 57.7
Column Total	2 7.7	5 19.2	13 50.0	6 23.1	. . . .	26 100.0

Chi Square = 1.54424 with 3 degrees of freedom Significance = 0.6721

TABLE 153

ANALYSIS OF RESPONSES BY COMPANY SIZE

(Languages: Machine)

Number of Employees	Responses					
	Critical	Necessary	Possible	Unnecessary	Uncertain	Row Total
500-1000	. .	1	3	7	. .	11
	. .	3.8	11.5	26.9	. .	42.3
Over 1000	. .	1	4	10	. .	15
	. .	3.8	15.4	38.5	. .	57.7
Column	. .	2	7	17	. .	26
Total	. .	7.7	26.9	65.4	. .	100.0

Chi Square = 0.05826 with 2 degrees of freedom Significance = 0.9713

TABLE 154

ANALYSIS OF RESPONSES BY COMPANY SIZE

(Languages: COBOL)

Number of Employees	Responses					
	Critical	Necessary	Possible	Unnecessary	Uncertain	Row Total
500-1000	4	5	. .	2	. .	11
	14.8	18.5	. .	7.4	. .	40.7
Over 1000	8	8	. .	0	. .	16
	29.6	29.6	. .	0.0	. .	59.3
Column	12	13	. .	2	. .	27
Total	44.4	48.1	. .	7.4	. .	100.0

Chi Square = 3.20978 with 2 degrees of freedom Significance = 0.2009

TABLE 155

ANALYSIS OF RESPONSES BY COMPANY SIZE

(Languages: BASIC)

Number of Employees	Responses					
	Critical	Necessary	Possible	Unnecessary	Uncertain	Row Total
500-1000	1 3.7	0 0.0	3 11.1	7 25.9	. . . .	11 40.7
Over 1000	1 3.7	3 11.1	9 33.3	3 11.1	. . . .	16 59.3
Column Total	2 7.4	3 11.1	12 44.4	10 37.0	. . . .	27 100.0

Chi Square = 6.91107 with 3 degrees of freedom Significance = 0.0748

TABLE 156

ANALYSIS OF RESPONSES BY COMPANY SIZE

(Languages: PL1)

Number of Employees	Responses					
	Critical	Necessary	Possible	Unnecessary	Uncertain	Row Total
500-1000	. . . .	1 3.8	3 11.5	7 26.9	. . . .	11 42.3
Over 1000	. . . .	4 15.4	5 19.2	6 23.1	. . . .	15 57.7
Column Total	. . . .	5 19.2	8 30.8	13 50.0	. . . .	26 100.0

Chi Square = 1.80424 with 2 degrees of freedom Significance = 0.4057

TABLE 157

ANALYSIS OF RESPONSES BY COMPANY SIZE

(Languages: FORTRAN)

Number of Employees	Responses					
	Critical	Necessary	Possible	Unnecessary	Uncertain	Row Total
500-1000	0 0.0	1 3.7	3 11.1	7 25.9	. . . .	11 40.7
Over 1000	2 7.4	4 14.8	6 22.2	4 14.8	. . . .	16 59.3
Column Total	2 7.4	5 18.5	9 33.3	11 40.7	. . . .	27 100.0

Chi Square = 4.85888 with 3 degrees of freedom Significance = 0.1824

TABLE 158

ANALYSIS OF RESPONSES BY COMPANY SIZE

(Languages: PASCAL)

Number of Employees	Responses					
	Critical	Necessary	Possible	Unnecessary	Uncertain	Row Total
500-1000	. . . .	. . . .	3 11.1	8 29.6	. . . .	11 40.7
Over 1000	. . . .	. . . .	8 29.6	8 29.6	. . . .	16 59.3
Column Total	. . . .	. . . .	11 40.7	16 59.3	. . . .	27 100.0

Chi Square = 0.61211 with 1 degrees of freedom Significance = 0.4340

TABLE 159

ANALYSIS OF RESPONSES BY COMPANY SIZE

(Languages: RPG II)

Number of Employees	Responses					
	Critical	Necessary	Possible	Unnecessary	Uncertain	Row Total
500-1000	2 7.4	0 0.0	3 11.1	6 22.2	. . . .	11 40.7
Over 1000	0 0.0	1 3.7	9 33.3	6 22.2	. . . .	16 59.3
Column Total	2 7.4	1 3.7	12 44.4	12 44.4	. . . .	27 100.0

Chi Square = 5.25425 with 3 degrees of freedom Significance = 0.1541

TABLE 160

ANALYSIS OF RESPONSES BY COMPANY SIZE

(Documentation)

Number of Employees	Responses					
	Critical	Necessary	Possible	Unnecessary	Uncertain	Row Total
500-1000	5 18.5	6 22.2	0 0.0	. . . .	. . . .	11 40.7
Over 1000	8 29.6	7 25.9	1 3.7	. . . .	. . . .	16 59.3
Column Total	13 48.1	13 48.1	1 3.7	. . . .	. . . .	27 100.0

Chi Square = 0.87325 with 2 degrees of freedom Significance = 0.6462

TABLE 161

ANALYSIS OF RESPONSES BY COMPANY SIZE

(Flowcharting)

Number of Employees	Responses					
	Critical	Necessary	Possible	Unnecessary	Uncertain	Row Total
500-1000	4 14.8	7 25.9	0 0.0	. . . .	. . . .	11 40.7
Over 1000	5 18.5	9 33.3	2 7.4	. . . .	. . . .	16 59.3
Column Total	9 33.3	16 59.3	2 7.4	. . . .	. . . .	27 100.0

Chi Square = 1.48615 with 2 degrees of freedom Significance = 0.4756

TABLE 162

ANALYSIS OF RESPONSES BY COMPANY SIZE

(Formatting)

Number of Employees	Responses					
	Critical	Necessary	Possible	Unnecessary	Uncertain	Row Total
500-1000	1 3.7	5 18.5	4 14.8	1 3.7	. . . .	11 40.7
Over 1000	4 14.8	8 29.6	4 14.8	0 0.0	. . . .	16 59.3
Column Total	5 18.5	13 48.1	8 29.6	1 3.7	. . . .	27 100.0

Chi Square = 2.65752 with 3 degrees of freedom Significance = 0.4475

TABLE 163

ANALYSIS OF RESPONSES BY COMPANY SIZE

(Graphics)

Number of Employees	Responses					
	Critical	Necessary	Possible	Unnecessary	Uncertain	Row Total
500-1000	. . . .	1 3.7	7 25.9	3 11.1	. . . .	11 40.7
Over 1000	. . . .	2 7.4	6 22.2	8 29.6	. . . .	16 59.3
Column Total	. . . .	3 11.1	13 48.1	11 40.7	. . . .	27 100.0

Chi Square = 1.81945 with 2 degrees of freedom Significance = 0.4026

TABLE 164

ANALYSIS OF RESPONSES BY COMPANY SIZE

(Binary Coded Decimal)

Number of Employees	Responses					
	Critical	Necessary	Possible	Unnecessary	Uncertain	Row Total
500-1000	2 7.4	2 7.4	5 18.5	2 7.4	. . . .	11 40.7
Over 1000	0 0.0	9 3.3	5 18.5	2 7.4	. . . .	16 59.3
Column Total	2 7.4	11 40.7	10 37.0	4 14.8	. . . .	27 100.0

Chi Square = 5.72494 with 3 degrees of freedom Significance = 0.1258

TABLE 165

ANALYSIS OF RESPONSES BY COMPANY SIZE

(Buffer Storage)

Number of Employees	Responses					
	Critical	Necessary	Possible	Unnecessary	Uncertain	Row Total
500-1000	1 3.7	1 3.7	5 18.5	4 14.8	. . . .	11 40.7
Over 1000	0 0.0	9 33.3	5 18.5	2 7.4	. . . .	16 59.3
Column Total	1 3.7	10 37.0	10 37.0	6 22.2	. . . .	27 100.0

Chi Square = 7.39432 with 3 degrees of freedom Significance = 0.0603

TABLE 166

ANALYSIS OF RESPONSES BY COMPANY SIZE

(Housekeeping--Factors Needed in Documentation)

Number of Employees	Responses					
	Critical	Necessary	Possible	Unnecessary	Uncertain	Row Total
500-1000	0 0.0	9 33.3	2 7.4	0 0.0	. . . .	11 40.7
Over 1000	6 22.2	6 22.2	3 11.1	1 3.7	. . . .	16 59.3
Column Total	6 22.2	15 55.6	5 18.5	1 3.7	. . . .	27 100.0

Chi Square = 7.11818 with 3 degrees of freedom Significance = 0.0682

TABLE 167

ANALYSIS OF RESPONSES BY COMPANY SIZE

(Library Functions: Program Storage)

Number of Employees	Responses					
	Critical	Necessary	Possible	Unnecessary	Uncertain	Row Total
500-1000	1 3.7	7 25.9	2 7.4	1 3.7	. . . .	11 40.7
Over 1000	3 11.1	10 37.0	3 11.1	0 0.0	. . . .	16 59.3
Column Total	4 14.8	17 63.0	5 18.5	1 3.7	. . . .	27 100.0

Chi Square = 1.86753 with 3 degrees of freedom Significance = 0.6004

TABLE 168

ANALYSIS OF RESPONSES BY COMPANY SIZE

(Structured Programming)

Number of Employees	Responses					
	Critical	Necessary	Possible	Unnecessary	Uncertain	Row Total
500-1000	2 7.4	3 11.1	4 14.8	2 7.4	. . . .	11 40.7
Over 1000	4 14.8	11 40.7	1 3.7	0 0.0	. . . .	16 59.3
Column Total	6 22.2	14 51.9	5 18.5	2 7.4	. . . .	27 100.0

Chi Square = 8.40024 with 3 degrees of freedom Significance = 0.0384

TABLE 169

ANALYSIS OF RESPONSES BY COMPANY SIZE

(Subroutines)

Number of Employees	Responses					
	Critical	Necessary	Possible	Unnecessary	Uncertain	Row Total
500-1000	2 7.4	4 14.8	4 14.8	1 3.7	. . . .	11 40.7
Over 1000	4 14.8	10 37.0	2 7.4	0 0.0	. . . .	16 59.3
Column Total	6 22.2	14 51.9	6 22.2	1 3.7	. . . .	27 100.0

Chi Square = 4.12013 with 3 degrees of freedom Significance = 0.2488

TABLE 170

ANALYSIS OF RESPONSES BY COMPANY SIZE

(Desk-Top Debugging)

Number of Employees	Responses					
	Critical	Necessary	Possible	Unnecessary	Uncertain	Row Total
500-1000	3 11.1	6 22.2	2 7.4	. . . .	. . . .	11 40.7
Over 1000	5 18.5	10 37.0	1 3.7	. . . .	. . . .	16 59.3
Column Total	8 29.6	16 59.3	3 11.1	. . . .	. . . .	27 100.0

Chi Square = 0.93963 with 2 degrees of freedom Significance = 0.6251

TABLE 171

ANALYSIS OF RESPONSES BY COMPANY SIZE

(Linear Programming)

Number of Employees	Responses					
	Critical	Necessary	Possible	Unnecessary	Uncertain	Row Total
500-1000	. .	3	5	3	. .	11
	. .	11.1	18.5	11.1	. .	40.7
Over 1000	. .	3	9	4	. .	16
	. .	11.1	33.3	14.8	. .	59.3
Column	. .	6	14	7	. .	27
Total	. .	22.2	51.9	25.9	. .	100.0

Chi Square = 0.37256 with 2 degrees of freedom Significance = 0.8300

TABLE 172

ANALYSIS OF RESPONSES BY COMPANY SIZE

(Decision Tables)

Number of Employees	Responses					
	Critical	Necessary	Possible	Unnecessary	Uncertain	Row Total
500-1000	1	5	3	2	. .	11
	3.7	18.5	11.1	7.4	. .	40.7
Over 1000	2	7	5	2	. .	16
	7.4	25.9	18.5	7.4	. .	59.3
Column	3	12	8	4	. .	27
Total	11.1	44.4	29.6	14.8	. .	100.0

Chi Square = 0.24929 with 3 degrees of freedom Significance = 0.9693

TABLE 173

ANALYSIS OF RESPONSES BY COMPANY SIZE

(Data Flow Diagrams)

Number of Employees	Responses					
	Critical	Necessary	Possible	Unnecessary	Uncertain	Row Total
500-1000	3 11.1	3 11.1	5 18.5	. . . .	. . . .	11 40.7
Over 1000	3 11.1	10 37.0	3 11.1	. . . .	. . . .	16 59.3
Column Total	6 22.2	13 48.1	8 29.6	. . . .	. . . .	27 100.0

Chi Square = 3.46203 with 2 degrees of freedom Significance = 0.1771

TABLE 174

ANALYSIS OF RESPONSES BY COMPANY SIZE

(Time-Sharing: On-Line)

Number of Employees	Responses					
	Critical	Necessary	Possible	Unnecessary	Uncertain	Row Total
500-1000	2 7.4	2 7.4	5 18.5	2 7.4	. . . .	11 40.7
Over 1000	4 14.8	6 22.2	6 22.2	0 0.0	. . . .	16 59.3
Column Total	6 22.2	8 29.6	11 40.7	2 7.4	. . . .	27 100.0

Chi Square = 3.96771 with 3 degrees of freedom Significance = 0.2650

TABLE 175

ANALYSIS OF RESPONSES BY COMPANY SIZE

(Batch)

Number of Employees	Responses					
	Critical	Necessary	Possible	Unnecessary	Uncertain	Row Total
500-1000	3 11.1	6 22.2	1 3.7	1 3.7	. . . .	11 40.7
Over 1000	3 11.1	13 48.1	0 0.0	0 0.0	. . . .	16 59.3
Column Total	6 22.2	19 70.4	1 3.7	1 3.7	. . . .	27 100.0

Chi Square = 3.78274 with 3 degrees of freedom Significance = 0.2859

TABLE 176

ANALYSIS OF RESPONSES BY COMPANY SIZE

(Working Inquiry)

Number of Employees	Responses					
	Critical	Necessary	Possible	Unnecessary	Uncertain	Row Total
500-1000	2 7.4	4 14.8	5 18.5	. . . .	. . . .	11 40.7
Over 1000	1 3.7	8 29.6	7 25.9	. . . .	. . . .	16 59.3
Column Total	3 11.1	12 44.4	12 44.4	. . . .	. . . .	27 100.0

Chi Square = 1.11222 with 2 degrees of freedom Significance = 0.5734

TABLE 177

ANALYSIS OF RESPONSES BY COMPANY SIZE

(Decision Making)

Number of Employees	Responses					
	Critical	Necessary	Possible	Unnecessary	Uncertain	Row Total
500-1000	2 7.4	5 18.5	4 14.8	. . . .	. . . .	11 40.7
Over 1000	2 7.4	9 33.3	5 18.5	. . . .	. . . .	16 59.3
Column Total	4 14.8	14 51.9	9 33.3	. . . .	. . . .	27 100.0

Chi Square = 0.33969 with 2 degrees of freedom Significance = 0.8438

TABLE 178

ANALYSIS OF RESPONSES BY COMPANY SIZE

(File Organization)

Number of Employees	Responses					
	Critical	Necessary	Possible	Unnecessary	Uncertain	Row Total
500-1000	4 16.0	6 24.0	1 4.0	. . . .	. . . .	11 44.0
Over 1000	3 12.0	11 44.0	0 0.0	. . . .	. . . .	14 56.0
Column Total	7 28.0	17 68.0	1 4.0	. . . .	. . . .	25 100.0

Chi Square = 2.28637 with 2 degrees of freedom Significance = 0.3188

TABLE 179

ANALYSIS OF RESPONSES BY COMPANY SIZE

(Sequential Files)

Number of Employees	Responses					
	Critical	Necessary	Possible	Unnecessary	Uncertain	Row Total
500-1000	4 14.8	6 22.2	1 3.7	. . . .	. . . .	11 40.7
Over 1000	3 11.1	13 48.1	0 0.0	. . . .	. . . .	16 59.3
Column Total	7 25.9	19 70.4	1 3.7	. . . .	. . . .	27 100.0

Chi Square = 2.89516 with 2 degrees of freedom Significance = 0.2351

TABLE 180

ANALYSIS OF RESPONSES BY COMPANY SIZE

(Random Files)

Number of Employees	Responses					
	Critical	Necessary	Possible	Unnecessary	Uncertain	Row Total
500-1000	4 14.8	6 22.2	1 3.7	. . . .	. . . .	11 40.7
Over 1000	3 11.1	12 44.4	1 3.7	. . . .	. . . .	16 59.3
Column Total	7 25.9	18 66.7	2 7.4	. . . .	. . . .	27 100.0

Chi Square = 1.26014 with 2 degrees of freedom Significance = 0.5326

TABLE 181

ANALYSIS OF RESPONSES BY COMPANY SIZE

(Indexing Files)

Number of Employees	Responses					
	Critical	Necessary	Possible	Unnecessary	Uncertain	Row Total
500-1000	4 15.4	5 19.2	2 7.7	. . . .	. . . .	11 42.3
Over 1000	4 15.4	10 38.5	1 3.8	. . . .	. . . .	15 57.7
Column Total	8 30.8	15 57.7	3 11.5	. . . .	. . . .	26 100.0

Chi Square = 1.41818 with 2 degrees of freedom Significance = 0.4921

TABLE 182

ANALYSIS OF RESPONSES BY COMPANY SIZE

(Data Base, Implementation and Utilization)

Number of Employees	Responses					
	Critical	Necessary	Possible	Unnecessary	Uncertain	Row Total
500-1000	0 0.0	4 14.8	7 25.9	0 0.0	. . . .	11 40.7
Over 1000	1 3.7	10 37.0	4 14.8	1 3.7	. . . .	16 59.3
Column Total	1 3.7	14 51.9	11 40.7	1 3.7	. . . .	27 100.0

Chi Square = 4.62219 with 3 degrees of freedom Significance = 0.2016

TABLE 183

ANALYSIS OF RESPONSES BY COMPANY SIZE

(Data File Utilization)

Number of Employees	Responses					
	Critical	Necessary	Possible	Unnecessary	Uncertain	Row Total
500-1000	1 3.7	8 29.6	2 7.4	0 0.0	. . . .	11 40.7
Over 1000	2 7.4	9 33.3	4 14.8	1 3.7	. . . .	16 59.3
Column Total	3 11.1	17 63.0	6 22.2	1 3.7	. . . .	27 100.0

Chi Square = 1.17313 with 3 degrees of freedom Significance = 0.7595

TABLE 184

ANALYSIS OF RESPONSES BY COMPANY SIZE

(Computer Output Microfilm)

Number of Employees	Responses					
	Critical	Necessary	Possible	Unnecessary	Uncertain	Row Total
500-1000	. . . .	1 3.7	6 22.2	4 14.8	. . . .	11 40.7
Over 1000	. . . .	1 3.7	10 37.0	5 18.5	. . . .	16 59.3
Column Total	. . . .	2 7.4	16 59.3	9 33.3	. . . .	27 100.0

Chi Square = 0.19176 with 2 degrees of freedom Significance = 0.9086

TABLE 185

ANALYSIS OF RESPONSES BY COMPANY SIZE

(Microfiche)

Number of Employees	Responses					
	Critical	Necessary	Possible	Unnecessary	Uncertain	Row Total
500-1000	. .	2	5	3	. .	10
	. .	7.7	19.2	11.5	. .	38.5
Over 1000	. .	3	9	4	. .	16
	. .	11.5	34.6	15.4	. .	61.5
Column	. .	5	14	7	. .	26
Total	. .	19.2	53.8	26.9	. .	100.0

Chi Square = 0.10679 with 2 degrees of freedom Significance = 0.9480

TABLE 186

ANALYSIS OF RESPONSES BY COMPANY SIZE

(Micrographics, Implementation and Utilization)

Number of Employees	Responses					
	Critical	Necessary	Possible	Unnecessary	Uncertain	Row Total
500-1000	. .	0	7	4	0	11
	. .	0.0	25.9	14.8	0.0	40.7
Over 1000	. .	1	7	7	1	16
	. .	3.7	25.9	25.9	3.7	59.3
Column	. .	1	14	11	1	27
Total	. .	3.7	51.9	40.7	3.7	100.0

Chi Square = 1.95945 with 3 degrees of freedom Significance = 0.5809

TABLE 187

ANALYSIS OF RESPONSES BY COMPANY SIZE

(File Retrieval Techniques)

Number of Employees	Responses					
	Critical	Necessary	Possible	Unnecessary	Uncertain	Row Total
500-1000	2 7.4	7 25.9	1 3.7	1 3.7	. . . .	11 40.7
Over 1000	2 7.4	11 40.7	2 7.4	1 3.7	. . . .	16 59.3
Column Total	4 14.8	18 66.7	3 11.1	2 7.4	. . . .	27 100.0

Chi Square = 0.30682 with 3 degrees of freedom Significance = 0.9587

TABLE 188

ANALYSIS OF RESPONSES BY COMPANY SIZE

(Record Protection)

Number of Employees	Responses					
	Critical	Necessary	Possible	Unnecessary	Uncertain	Row Total
500-1000	2 7.4	5 18.5	3 11.1	1 3.7	. . . .	11 40.7
Over 1000	3 11.1	8 29.6	4 14.8	1 3.7	. . . .	16 59.3
Column Total	5 18.5	13 48.1	7 25.9	2 7.4	. . . .	27 100.0

Chi Square = 0.11312 with 3 degrees of freedom Significance = 0.9902

TABLE 189

ANALYSIS OF RESPONSES BY COMPANY SIZE

(Reprographics)

Number of Employees	Responses					
	Critical	Necessary	Possible	Unnecessary	Uncertain	Row Total
500-1000	. . . .	3 11.1	4 14.8	4 14.8	0 0.0	11 40.7
Over 1000	. . . .	1 3.7	7 25.9	7 25.9	1 3.7	16 59.3
Column Total	. . . .	4 14.8	11 40.7	11 40.7	1 3.7	27 100.0

Chi Square = 2.80669 with 3 degrees of freedom Significance = 0.4224

TABLE 190

ANALYSIS OF RESPONSES BY COMPANY SIZE

(Control Cycles)

Number of Employees	Responses					
	Critical	Necessary	Possible	Unnecessary	Uncertain	Row Total
500-1000	. . . .	5 18.5	4 14.8	2 7.4	. . . .	11 40.7
Over 1000	. . . .	5 18.5	9 33.3	2 7.4	. . . .	16 59.3
Column Total	. . . .	10 37.0	13 48.1	4 14.8	. . . .	27 100.0

Chi Square = 1.03256 with 2 degrees of freedom Significance = 0.5967

TABLE 191

ANALYSIS OF RESPONSES BY COMPANY SIZE

(Cost Analysis)

Number of Employees	Responses					
	Critical	Necessary	Possible	Unnecessary	Uncertain	Row Total
500-1000	1 3.7	2 7.4	2 7.4	6 22.2	. . . .	11 40.7
Over 1000	1 3.7	5 18.5	7 25.9	3 11.1	. . . .	16 59.3
Column Total	2 7.4	7 25.9	9 33.3	9 33.3	. . . .	27 100.0

Chi Square = 4.28450 with 3 degrees of freedom Significance = 0.2323

TABLE 192

ANALYSIS OF RESPONSES BY COMPANY SIZE

(Disposition of Files)

Number of Employees	Responses					
	Critical	Necessary	Possible	Unnecessary	Uncertain	Row Total
500-1000	1 3.7	1 3.7	6 22.2	3 11.1	. . . .	11 40.7
Over 1000	0 0.0	3 11.1	11 40.7	2 7.4	. . . .	16 59.3
Column Total	1 3.7	4 14.8	17 63.0	5 18.5	. . . .	27 100.0

Chi Square = 2.84212 with 3 degrees of freedom Significance = 0.4166

TABLE 193

ANALYSIS OF RESPONSES BY COMPANY SIZE

(Forms Management)

Number of Employees	Responses					
	Critical	Necessary	Possible	Unnecessary	Uncertain	Row Total
500-1000	2 7.4	2 7.4	4 14.8	3 11.1	. . . .	11 40.7
Over 1000	0 0.0	5 18.5	8 29.6	3 11.1	. . . .	16 59.3
Column Total	2 7.4	7 25.9	12 44.4	6 22.2	. . . .	27 100.0

Chi Square = 3.82426 with 3 degrees of freedom Significance = 0.2811

TABLE 194

ANALYSIS OF RESPONSES BY COMPANY SIZE

(Methods of Electronic Indexing)

Number of Employees	Responses					
	Critical	Necessary	Possible	Unnecessary	Uncertain	Row Total
500-1000	1 3.7	7 25.9	1 3.7	2 7.4	. . . .	11 40.7
Over 1000	1 3.7	7 25.9	6 22.2	2 7.4	. . . .	16 59.3
Column Total	2 7.4	14 51.9	7 25.9	4 14.8	. . . .	27 100.0

Chi Square = 2.73945 with 3 degrees of freedom Significance = 0.4336

TABLE 195

ANALYSIS OF RESPONSES BY COMPANY SIZE

(File Security)

Number of Employees	Responses					
	Critical	Necessary	Possible	Unnecessary	Uncertain	Row Total
500-1000	4 14.8	4 14.8	2 7.4	1 3.7	. . . .	11 40.7
Over 1000	3 11.1	9 33.3	4 14.8	0 0.0	. . . .	16 59.3
Column Total	7 25.9	13 48.1	6 22.2	1 3.7	. . . .	27 100.0

Chi Square = 2.90634 with 3 degrees of freedom Significance = 0.4063

TABLE 196

ANALYSIS OF RESPONSES BY COMPANY SIZE

(File Back-up Techniques)

Number of Employees	Responses					
	Critical	Necessary	Possible	Unnecessary	Uncertain	Row Total
500-1000	4 14.8	6 22.2	1 3.7	. . . .	. . . .	11 40.7
Over 1000	5 18.5	6 22.2	5 18.5	. . . .	. . . .	16 59.3
Column Total	9 33.3	12 44.4	6 22.2	. . . .	. . . .	27 100.0

Chi Square = 1.91761 with 2 degrees of freedom Significance = 0.3834

TABLE 197

ANALYSIS OF RESPONSES BY COMPANY SIZE

(Visual Display Terminals)

Number of Employees	Responses					
	Critical	Necessary	Possible	Unnecessary	Uncertain	Row Total
500-1000	3 11.1	2 7.4	6 22.2	0 0.0	. . . .	11 40.7
Over 1000	4 14.8	9 33.3	2 7.4	1 3.7	. . . .	16 59.3
Column Total	7 25.9	11 40.7	8 29.6	1 3.7	. . . .	27 100.0

Chi Square = 6.90838 with 3 degrees of freedom Significance = 0.0749

TABLE 198

ANALYSIS OF RESPONSES BY COMPANY SIZE

(Punched Card Transmission Terminals)

Number of Employees	Responses					
	Critical	Necessary	Possible	Unnecessary	Uncertain	Row Total
500-1000	. . . .	2 7.4	5 18.5	4 14.8	0 0.0	11 40.7
Over 1000	. . . .	2 7.4	7 25.9	6 22.2	1 3.7	16 59.3
Column Total	. . . .	4 14.8	12 44.4	10 37.0	1 3.7	27 100.0

Chi Square = 0.83608 with 3 degrees of freedom Significance = 0.8408

TABLE 199

ANALYSIS OF RESPONSES BY COMPANY SIZE

(Teledata Transmitter-Receiver)

Number of Employees	Responses					
	Critical	Necessary	Possible	Unnecessary	Uncertain	Row Total
500-1000	0 0.0	2 7.4	5 18.5	3 11.1	1 3.7	11 40.7
Over 1000	2 7.4	3 11.1	6 22.2	5 18.5	0 0.0	16 59.3
Column Total	2 7.4	5 18.5	11 40.7	8 29.6	1 3.7	27 100.0

Chi Square = 2.96672 with 4 degrees of freedom Significance = 0.5634

TABLE 200

ANALYSIS OF RESPONSES BY COMPANY SIZE

(Telespeed Tape-to-Tape)

Number of Employees	Responses					
	Critical	Necessary	Possible	Unnecessary	Uncertain	Row Total
500-1000	. . . .	2 7.4	3 11.1	5 18.5	1 3.7	11 40.7
Over 1000	. . . .	1 3.7	9 33.3	6 22.2	0 0.0	16 59.3
Column Total	. . . .	3 11.1	12 44.4	11 40.7	1 3.7	27 100.0

Chi Square = 3.62255 with 3 degrees of freedom Significance = 0.3052

TABLE 201

ANALYSIS OF RESPONSES BY COMPANY SIZE

(Punched Tape Transmission Terminals)

Number of Employees	Responses					
	Critical	Necessary	Possible	Unnecessary	Uncertain	Row Total
500-1000	. . . .	1 3.7	3 11.1	7 25.9	. . . .	11 40.7
Over 1000	. . . .	0 0.0	9 33.3	7 25.9	. . . .	16 59.3
Column Total	. . . .	1 3.7	12 44.4	14 51.9	. . . .	27 100.0

Chi Square = 3.18324 with 2 degrees of freedom Significance = 0.2036

TABLE 202

ANALYSIS OF RESPONSES BY COMPANY SIZE

(Magnetic Tape Transmission)

Number of Employees	Responses					
	Critical	Necessary	Possible	Unnecessary	Uncertain	Row Total
500-1000	2 7.4	2 7.4	4 14.8	3 11.1	. . . .	11 40.7
Over 1000	0 0.0	3 11.1	8 29.6	5 18.5	. . . .	16 59.3
Column Total	2 7.4	5 18.5	12 44.4	8 29.6	. . . .	27 100.0

Chi Square = 3.21775 with 3 degrees of freedom Significance = 0.3593

TABLE 203

ANALYSIS OF RESPONSES BY COMPANY SIZE

(Computer Transmission Control Terminals)

Number of Employees	Responses					
	Critical	Necessary	Possible	Unnecessary	Uncertain	Row Total
500-1000	1 3.7	4 14.8	4 14.8	2 7.4	. . . .	11 40.7
Over 1000	0 0.0	3 11.1	10 37.0	3 11.1	. . . .	16 59.3
Column Total	1 3.7	7 25.9	14 51.9	5 18.5	. . . .	27 100.0

Chi Square = 3.09448 with 3 degrees of freedom Significance = 0.3773

TABLE 204

ANALYSIS OF RESPONSES BY COMPANY SIZE

(Facsimile Terminals)

Number of Employees	Responses					
	Critical	Necessary	Possible	Unnecessary	Uncertain	Row Total
500-1000	. . . .	2 7.4	5 18.5	4 14.8	0 0.0	11 40.7
Over 1000	. . . .	1 3.7	8 29.6	6 22.2	1 3.7	16 59.3
Column Total	. . . .	3 11.1	13 48.1	10 37.0	1 3.7	27 100.0

Chi Square = 1.55297 with 3 degrees of freedom Significance = 0.6701

TABLE 205

ANALYSIS OF RESPONSES BY COMPANY SIZE

(Microcomputer as Transmitter-Receiver)

Number of Employees	Responses					
	Critical	Necessary	Possible	Unnecessary	Uncertain	Row Total
500-1000	. . . .	2 7.4	5 18.5	4 14.8	. . . .	11 40.7
Over 1000	. . . .	5 18.5	7 25.9	4 14.8	. . . .	16 59.3
Column Total	. . . .	7 25.9	12 44.4	8 29.6	. . . .	27 100.0

Chi Square = 0.71773 with 2 degrees of freedom Significance = 0.6985

TABLE 206

ANALYSIS OF RESPONSES BY COMPANY SIZE

(Data Communications)

Number of Employees	Responses					
	Critical	Necessary	Possible	Unnecessary	Uncertain	Row Total
500-1000	2 7.4	1 3.7	7 25.9	1 3.7	. . . .	11 40.7
Over 1000	2 7.4	6 22.2	5 18.5	3 11.1	. . . .	16 59.3
Column Total	4 14.8	7 25.9	12 44.4	4 14.8	. . . .	27 100.0

Chi Square = 4.12013 with 3 degrees of freedom Significance = 0.2488

TABLE 207

ANALYSIS OF RESPONSES BY COMPANY SIZE

(Communicating Word Processors)

Number of Employees	Responses					
	Critical	Necessary	Possible	Unnecessary	Uncertain	Row Total
500-1000	0 0.0	2 7.4	6 22.2	3 11.1	. . . .	11 40.7
Over 1000	2 7.4	3 11.1	9 33.3	2 7.4	. . . .	16 59.3
Column Total	2 7.4	5 18.5	15 55.6	5 18.5	. . . .	27 100.0

Chi Square = 2.14773 with 3 degrees of freedom Significance = 0.5423

TABLE 208

ANALYSIS OF RESPONSES BY COMPANY SIZE

(TELEX/TWX)

Number of Employees	Responses					
	Critical	Necessary	Possible	Unnecessary	Uncertain	Row Total
500-1000	. . . .	1 3.7	6 22.2	4 14.8	. . . .	11 40.7
Over 1000	. . . .	4 14.8	8 29.6	4 14.8	. . . .	16 59.3
Column Total	. . . .	5 18.5	14 51.9	8 29.6	. . . .	27 100.0

Chi Square = 1.20097 with 2 degrees of freedom Significance = 0.5485

TABLE 209

ANALYSIS OF RESPONSES BY COMPANY SIZE

(Facsimile)

Number of Employees	Responses					
	Critical	Necessary	Possible	Unnecessary	Uncertain	Row Total
500-1000	. .	1	5	5	. .	11
	. .	3.7	18.5	18.5	. .	40.7
Over 1000	. .	2	10	4	. .	16
	. .	7.4	37.0	14.8	. .	59.3
Column	. .	3	15	9	. .	27
Total	. .	11.1	55.6	33.3	. .	100.0

Chi Square = 1.22727 with 2 degrees of freedom Significance = 0.5414

TABLE 210

ANALYSIS OF RESPONSES BY COMPANY SIZE

(Message Switching)

Number of Employees	Responses					
	Critical	Necessary	Possible	Unnecessary	Uncertain	Row Total
500-1000	1	0	6	4	. .	11
	3.7	0.0	22.2	14.8	. .	40.7
Over 1000	0	6	7	3	. .	16
	0.0	22.2	25.9	11.1	. .	59.3
Column	1	6	13	7	. .	27
Total	3.7	22.2	48.1	25.9	. .	100.0

Chi Square = 6.51735 with 3 degrees of freedom Significance = 0.0890

TABLE 211

ANALYSIS OF RESPONSES BY COMPANY SIZE

(Centrex)

Number of Employees	Responses					
	Critical	Necessary	Possible	Unnecessary	Uncertain	Row Total
500-1000	. . . .	2 7.4	5 18.5	4 14.8	0 0.0	11 40.7
Over 1000	. . . .	0 0.0	9 33.3	6 22.2	1 3.7	16 59.3
Column Total	. . . .	2 7.4	14 51.9	10 37.0	1 3.7	27 100.0

Chi Square = 3.74537 with 3 degrees of freedom Significance = 0.2903

TABLE 212

ANALYSIS OF RESPONSES BY COMPANY SIZE

(Teleconferencing)

Number of Employees	Responses					
	Critical	Necessary	Possible	Unnecessary	Uncertain	Row Total
500-1000	0 0.0	2 7.4	5 18.5	4 14.8	0 0.0	11 40.7
Over 1000	1 3.7	2 7.4	7 25.9	5 18.5	1 3.7	16 59.3
Column Total	1 3.7	4 14.8	12 44.4	9 33.3	1 3.7	27 100.0

Chi Square = 1.57244 with 4 degrees of freedom Significance = 0.8137

TABLE 213

ANALYSIS OF RESPONSES BY COMPANY SIZE

(Remote Data Processing)

Number of Employees	Responses					
	Critical	Necessary	Possible	Unnecessary	Uncertain	Row Total
500-1000	3 11.1	2 7.4	5 18.5	1 3.7	. . . .	11 40.7
Over 1000	0 0.0	5 18.5	8 29.6	3 11.1	. . . .	16 59.3
Column Total	3 11.1	7 25.9	13 48.1	4 14.8	. . . .	27 100.0

Chi Square = 5.23150 with 3 degrees of freedom Significance = 0.1556

TABLE 214

ANALYSIS OF RESPONSES BY COMPANY SIZE

(Security)

Number of Employees	Responses					
	Critical	Necessary	Possible	Unnecessary	Uncertain	Row Total
500-1000	4 14.8	2 7.4	3 11.1	2 7.4	. . . .	11 40.7
Over 1000	1 3.7	5 18.5	8 29.6	2 7.4	. . . .	16 59.3
Column Total	5 18.5	7 25.9	11 40.7	4 14.8	. . . .	27 100.0

Chi Square = 4.58992 with 3 degrees of freedom Significance = 0.2044

TABLE 215

ANALYSIS OF RESPONSES BY COMPANY SIZE

(Data-Phone)

Number of Employees	Responses					
	Critical	Necessary	Possible	Unnecessary	Uncertain	Row Total
500-1000	1 3.7	2 7.4	4 14.8	4 14.8	. . . .	11 40.7
Over 1000	0 0.0	9 33.3	5 18.5	2 7.4	. . . .	16 59.3
Column Total	1 3.7	11 40.7	9 33.3	6 22.2	. . . .	27 100.0

Chi Square = 5.49483 with 3 degrees of freedom Significance = 0.1389

TABLE 216

ANALYSIS OF RESPONSES BY COMPANY SIZE

(Composition Skills: Oral)

Number of Employees	Responses					
	Critical	Necessary	Possible	Unnecessary	Uncertain	Row Total
500-1000	5 18.5	4 14.8	2 7.4	0 0.0	. . . .	11 40.7
Over 1000	2 7.4	11 40.7	2 7.4	1 3.7	. . . .	16 59.3
Column Total	7 25.9	15 55.6	4 14.8	1 3.7	. . . .	27 100.0

Chi Square = 4.79074 with 3 degrees of freedom Significance = 0.1878

TABLE 217

ANALYSIS OF RESPONSES BY COMPANY SIZE

(Composition Skills: Written)

Number of Employees	Responses					
	Critical	Necessary	Possible	Unnecessary	Uncertain	Row Total
500-1000	5 18.5	6 22.2	. . . .	. . . .	. . . .	11 40.7
Over 1000	3 11.1	13 48.1	. . . .	. . . .	. . . .	16 59.3
Column Total	8 29.6	19 70.4	. . . .	. . . .	. . . .	27 100.0

Chi Square = 1.13265 with 1 degrees of freedom Significance = 0.2872

TABLE 218

ANALYSIS OF RESPONSES BY COMPANY SIZE

(Keyboarding: Speed)

Number of Employees	Responses					
	Critical	Necessary	Possible	Unnecessary	Uncertain	Row Total
500-1000	5 18.5	5 18.5	1 3.7	. . . .	. . . .	11 40.7
Over 1000	1 3.7	11 40.7	4 14.8	. . . .	. . . .	16 59.3
Column Total	6 22.2	16 59.3	5 18.5	. . . .	. . . .	27 100.0

Chi Square = 5.99638 with 2 degrees of freedom Significance = 0.0499

TABLE 219

ANALYSIS OF RESPONSES BY COMPANY SIZE

(Keyboarding: Accuracy)

Number of Employees	Responses					
	Critical	Necessary	Possible	Unnecessary	Uncertain	Row Total
500-1000	7 25.9	4 14.8	. . . .	. . . .	. . . .	11 40.7
Over 1000	5 18.5	11 40.7	. . . .	. . . .	. . . .	16 59.3
Column Total	12 44.4	15 55.6	. . . .	. . . .	. . . .	27 100.0

Chi Square = 1.61271 with 1 degrees of freedom Significance = 0.2041

TABLE 220

ANALYSIS OF RESPONSES BY COMPANY SIZE

(Proofreading Performance)

Number of Employees	Responses					
	Critical	Necessary	Possible	Unnecessary	Uncertain	Row Total
500-1000	5 18.5	6 22.2	0 0.0	. . . .	. . . .	11 40.7
Over 1000	4 14.8	11 40.7	1 3.7	. . . .	. . . .	16 59.3
Column Total	9 33.3	17 63.0	1 3.7	. . . .	. . . .	27 100.0

Chi Square = 1.71457 with 2 degrees of freedom Significance = 0.4243

TABLE 221

ANALYSIS OF RESPONSES BY COMPANY SIZE

(Time Utilization and Organizational Ability)

Number of Employees	Responses					
	Critical	Necessary	Possible	Unnecessary	Uncertain	Row Total
500-1000	5 18.5	5 18.5	1 3.7	. . . .	. . . .	11 40.7
Over 1000	4 14.8	9 33.3	3 11.1	. . . .	. . . .	16 59.3
Column Total	9 33.3	14 51.9	4 14.8	. . . .	. . . .	27 100.0

Chi Square = 1.37520 with 2 degrees of freedom Significance = 0.5028

TABLE 222

ANALYSIS OF RESPONSES BY COMPANY SIZE

(Business English)

Number of Employees	Responses					
	Critical	Necessary	Possible	Unnecessary	Uncertain	Row Total
500-1000	9 33.3	2 7.4	. . . .	. . . .	. . . .	11 40.7
Over 1000	5 18.5	11 40.7	. . . .	. . . .	. . . .	16 59.3
Column Total	14 51.9	13 48.1	. . . .	. . . .	. . . .	27 100.0

Chi Square = 4.80478 with 1 degrees of freedom Significance = 0.0284

TABLE 223

ANALYSIS OF RESPONSES BY COMPANY SIZE

(Form Letters)

Number of Employees	Responses					
	Critical	Necessary	Possible	Unnecessary	Uncertain	Row Total
500-1000	2 7.4	4 14.8	4 14.8	1 3.7	. . . .	11 40.7
Over 1000	1 3.7	6 22.2	8 29.6	1 3.7	. . . .	16 59.3
Column Total	3 11.1	10 37.0	12 44.4	2 7.4	. . . .	27 100.0

Chi Square = 1.18125 with 3 degrees of freedom Significance = 0.7575

TABLE 224

ANALYSIS OF RESPONSES BY COMPANY SIZE

(Alphanumeric Sorting)

Number of Employees	Responses					
	Critical	Necessary	Possible	Unnecessary	Uncertain	Row Total
500-1000	1 3.7	3 11.1	7 25.9	0 0.0	. . . .	11 40.7
Over 1000	1 3.7	7 25.9	7 25.9	1 3.7	. . . .	16 59.3
Column Total	2 7.4	10 37.0	14 51.9	1 3.7	. . . .	27 100.0

Chi Square = 1.73352 with 3 degrees of freedom Significance = 0.6295

TABLE 225

ANALYSIS OF RESPONSES BY COMPANY SIZE

(List Processing)

Number of Employees	Responses					
	Critical	Necessary	Possible	Unnecessary	Uncertain	Row Total
500-1000	0 0.0	3 11.1	7 25.9	1 3.7	. . . .	11 40.7
Over 1000	2 7.4	5 18.5	6 22.2	3 11.1	. . . .	16 59.3
Column Total	2 7.4	8 29.6	13 48.1	4 14.8	. . . .	27 100.0

Chi Square = 2.74514 with 3 degrees of freedom Significance = 0.4326

TABLE 226

ANALYSIS OF RESPONSES BY COMPANY SIZE

(Floppy Disk)

Number of Employees	Responses					
	Critical	Necessary	Possible	Unnecessary	Uncertain	Row Total
500-1000	1 3.7	2 7.4	4 14.8	3 11.1	1 3.7	11 40.7
Over 1000	1 3.7	4 14.8	8 29.6	3 11.1	0 0.0	16 59.3
Column Total	2 7.4	6 22.2	12 44.4	6 22.2	1 3.7	27 100.0

Chi Square = 2.14773 with 4 degrees of freedom Significance = 0.7086

TABLE 227

ANALYSIS OF RESPONSES BY COMPANY SIZE

(Formatting and Editing)

Number of Employees	Responses					
	Critical	Necessary	Possible	Unnecessary	Uncertain	Row Total
500-1000	1 3.7	7 25.9	2 7.4	1 3.7	. . . .	11 40.7
Over 1000	1 3.7	11 40.7	3 11.1	1 3.7	. . . .	16 59.3
Column Total	2 7.4	18 66.7	5 18.5	2 7.4	. . . .	27 100.0

Chi Square = 0.16875 with 3 degrees of freedom Significance = 0.9825

TABLE 228

ANALYSIS OF RESPONSES BY COMPANY SIZE

(Justification)

Number of Employees	Responses					
	Critical	Necessary	Possible	Unnecessary	Uncertain	Row Total
500-1000	1 3.7	3 11.1	5 18.5	2 7.4	. . . .	11 40.7
Over 1000	0 0.0	8 29.6	6 22.2	2 7.4	. . . .	16 59.3
Column Total	1 3.7	11 40.7	11 40.7	4 14.8	. . . .	27 100.0

Chi Square = 2.52427 with 3 degrees of freedom Significance = 0.4709

TABLE 229

ANALYSIS OF RESPONSES BY COMPANY SIZE

(Machine Transcription)

Number of Employees	Responses					
	Critical	Necessary	Possible	Unnecessary	Uncertain	Row Total
500-1000	1 3.7	5 18.5	4 14.8	1 3.7	0 0.0	11 40.7
Over 1000	1 3.7	4 14.8	8 29.6	2 7.4	1 3.7	16 59.3
Column Total	2 7.4	9 33.3	12 44.4	3 11.1	1 3.7	27 100.0

Chi Square = 1.91761 with 4 degrees of freedom Significance = 0.7509

TABLE 230

ANALYSIS OF RESPONSES BY COMPANY SIZE

(Split Keyboarding)

Number of Employees	Responses					
	Critical	Necessary	Possible	Unnecessary	Uncertain	Row Total
500-1000	0 0.0	2 7.4	6 22.2	3 11.1	0 0.0	11 40.7
Over 1000	2 7.4	3 11.1	8 29.6	2 7.4	1 3.7	16 59.3
Column Total	2 7.4	5 18.5	14 51.9	5 18.5	1 3.7	27 100.0

Chi Square = 2.85779 with 4 degrees of freedom Significance = 0.5819

TABLE 231

ANALYSIS OF RESPONSES BY COMPANY SIZE

(Intelligent Copiers)

Number of Employees	Responses					
	Critical	Necessary	Possible	Unnecessary	Uncertain	Row Total
500-1000	. . . .	2 7.4	7 25.9	2 7.4	0 0.0	11 40.7
Over 1000	. . . .	2 7.4	9 33.3	4 14.8	1 3.7	16 59.3
Column Total	. . . .	4 14.8	16 59.3	6 22.2	1 3.7	27 100.0

Chi Square = 1.02592 with 3 degrees of freedom Significance = 0.7950

TABLE 232

ANALYSIS OF RESPONSES BY COMPANY SIZE

(Shared-Logic Word Processor)

Number of Employees	Responses					
	Critical	Necessary	Possible	Unnecessary	Uncertain	Row Total
500-1000	1 3.7	1 3.7	6 22.2	3 11.1	0 0.0	11 40.7
Over 1000	0 0.0	3 11.1	7 25.9	5 18.5	1 3.7	16 59.3
Column Total	1 3.7	4 14.8	13 48.1	8 29.6	1 3.7	27 100.0

Chi Square = 2.74513 with 4 degrees of freedom Significance = 0.6013

TABLE 233

ANALYSIS OF RESPONSES BY COMPANY SIZE

(Stand-Alone Processors)

Number of Employees	Responses					
	Critical	Necessary	Possible	Unnecessary	Uncertain	Row Total
500-1000	0 0.0	4 14.8	5 18.5	2 7.4	. . . .	11 40.7
Over 1000	2 7.4	7 25.9	5 18.5	2 7.4	. . . .	16 59.3
Column Total	2 7.4	11 40.7	10 37.0	4 14.8	. . . .	27 100.0

Chi Square = 1.95945 with 3 degrees of freedom Significance = 0.5809

TABLE 234

ANALYSIS OF RESPONSES BY COMPANY SIZE

(Administrative Activities)

Number of Employees	Responses					
	Critical	Necessary	Possible	Unnecessary	Uncertain	Row Total
500-1000	1 3.7	3 11.1	6 22.2	1 3.7	. . . .	11 40.7
Over 1000	1 3.7	8 29.6	7 25.9	0 0.0	. . . .	16 59.3
Column Total	2 7.4	11 40.7	13 48.1	1 3.7	. . . .	27 100.0

Chi Square = 2.50979 with 3 degrees of freedom Significance = 0.4735

TABLE 235

ANALYSIS OF RESPONSES BY COMPANY SIZE

(Mag Card)

Number of Employees	Responses					
	Critical	Necessary	Possible	Unnecessary	Uncertain	Row Total
500-1000	. . . .	5 18.5	4 14.8	2 7.4	. . . .	11 40.7
Over 1000	. . . .	3 11.1	10 37.0	3 11.1	. . . .	16 59.3
Column Total	. . . .	8 29.6	14 51.9	5 18.5	. . . .	27 100.0

Chi Square = 2.42879 with 2 degrees of freedom Significance = 0.2969

APPENDIX B

INTERVIEW-QUESTIONNAIRE

GENERAL KNOWLEDGE

ENTRY-LEVEL PERSONNEL SHOULD HAVE GENERAL KNOWLEDGE OF/IN:	CRITICAL	NECESSARY	POSSIBLE	UNNECESSARY	UNCERTAIN	
Basic tools of information systems analyst	☐	☐	☐	☐	☐	1
Information system's development concept	☐	☐	☐	☐	☐	2
Computation skills:						
General math	☐	☐	☐	☐	☐	3
Algebra	☐	☐	☐	☐	☐	4
Boolean algebra	☐	☐	☐	☐	☐	5
Numbering systems	☐	☐	☐	☐	☐	6
Communication skills:						
Oral:						
Speaking	☐	☐	☐	☐	☐	7
Listening	☐	☐	☐	☐	☐	8
Written:						
Letters	☐	☐	☐	☐	☐	9
Reports	☐	☐	☐	☐	☐	10
Basic office skills:						
Typewriting	☐	☐	☐	☐	☐	11
Office machines	☐	☐	☐	☐	☐	12
Bookkeeping	☐	☐	☐	☐	☐	13
Transcription	☐	☐	☐	☐	☐	14
Vocabulary:						
General business	☐	☐	☐	☐	☐	15
Accounting	☐	☐	☐	☐	☐	16
Computer	☐	☐	☐	☐	☐	17
Business cycles	☐	☐	☐	☐	☐	18
Economic literacy	☐	☐	☐	☐	☐	19

Other _____

PERSONAL ATTITUDES OF ENTRY-LEVEL PERSONNEL:	CRITICAL	NECESSARY	POSSIBLE	UNNECESSARY	UNCERTAIN	
Believes in free enterprise	☐	☐	☐	☐	☐	33
Positive self-image	☐	☐	☐	☐	☐	34
High job interest	☐	☐	☐	☐	☐	35
Future oriented	☐	☐	☐	☐	☐	36
Company committed	☐	☐	☐	☐	☐	37
Goal oriented	☐	☐	☐	☐	☐	38
Respect for dignity of work	☐	☐	☐	☐	☐	39
Seeks opportunities for job improvements	☐	☐	☐	☐	☐	40
Welcomes technological advances	☐	☐	☐	☐	☐	41
Respects confidential material	☐	☐	☐	☐	☐	42

Other _____

PERSONAL TRAITS OF ENTRY-LEVEL PERSONNEL:						
Honest	☐	☐	☐	☐	☐	43
Diligent	☐	☐	☐	☐	☐	44
Conscientious	☐	☐	☐	☐	☐	45
Punctual	☐	☐	☐	☐	☐	46
Sincere	☐	☐	☐	☐	☐	47
Displays initiative	☐	☐	☐	☐	☐	48
Logical decision-making	☐	☐	☐	☐	☐	49
Emotionally stable	☐	☐	☐	☐	☐	50
Self-confident	☐	☐	☐	☐	☐	51
Community contributor	☐	☐	☐	☐	☐	52

Other _____

ENTRY-LEVEL PERSONNEL SHOULD HAVE UNDERSTANDING OF:						
Competitive aspect of business	☐	☐	☐	☐	☐	20
Individual's productivity as contribution to society	☐	☐	☐	☐	☐	21
Critical role of information	☐	☐	☐	☐	☐	22
Needs, sources, and use of money	☐	☐	☐	☐	☐	23
Work ethics	☐	☐	☐	☐	☐	24
Increased role of government in production & distribution	☐	☐	☐	☐	☐	25

Other _____

WORK HABITS OF ENTRY-LEVEL PERSONNEL:						
Effective use of materials and supplies	☐	☐	☐	☐	☐	26
Willing to assume responsibility	☐	☐	☐	☐	☐	27
Team-worker	☐	☐	☐	☐	☐	28
Effective use of time	☐	☐	☐	☐	☐	29
Calm under pressure	☐	☐	☐	☐	☐	30
Pleasant under adverse conditions	☐	☐	☐	☐	☐	31
Good work-area organization	☐	☐	☐	☐	☐	32

Other _____

DATA PROCESSING

STARTING PERSONNEL SHOULD BE EFFICIENT USER OF:						
Input:						
Optical Scanners	☐	☐	☐	☐	☐	53
Paper Tape	☐	☐	☐	☐	☐	54
Mag Card	☐	☐	☐	☐	☐	55
Floppy Disk	☐	☐	☐	☐	☐	56
Hard Disk	☐	☐	☐	☐	☐	57
Drum	☐	☐	☐	☐	☐	58
Card	☐	☐	☐	☐	☐	59
Keyboard	☐	☐	☐	☐	☐	60
Voice	☐	☐	☐	☐	☐	61
Microfilm	☐	☐	☐	☐	☐	62
Light Pen	☐	☐	☐	☐	☐	63

Other _____

Please return to: CHARLOTTE HINSON
Business and Economics Department
University of Science & Arts of Oklahoma
Chickasha, OK 73018

DATA PROCESSING

STARTING PERSONNEL SHOULD BE EFFICIENT USER OF:

	CRITICAL	NECESSARY	POSSIBLE	UNNECESSARY	UNCERTAIN	
Output:						
Printed reports	☐	☐	☐	☐	☐	64
Audio outputs	☐	☐	☐	☐	☐	65
Plotted graph	☐	☐	☐	☐	☐	66
Microfilm	☐	☐	☐	☐	☐	67
Visual display terminal	☐	☐	☐	☐	☐	68
Color display terminal	☐	☐	☐	☐	☐	69
Microfishe	☐	☐	☐	☐	☐	70
Other _____						
Computer Systems:						
Large	☐	☐	☐	☐	☐	71
Mid-size	☐	☐	☐	☐	☐	72
Mini	☐	☐	☐	☐	☐	73
Microcomputers	☐	☐	☐	☐	☐	74
Intelligent terminals	☐	☐	☐	☐	☐	75

STARTING PERSONNEL SHOULD HAVE KNOWLEDGE OF:

Languages:						
Assembly	☐	☐	☐	☐	☐	76
Machine	☐	☐	☐	☐	☐	77
COBOL	☐	☐	☐	☐	☐	78
BASIC	☐	☐	☐	☐	☐	79
PL1	☐	☐	☐	☐	☐	80
FORTRAN	☐	☐	☐	☐	☐	1
PASCAL	☐	☐	☐	☐	☐	2
RPG II	☐	☐	☐	☐	☐	3
Other _____						
Documentation	☐	☐	☐	☐	☐	4
Flowcharting	☐	☐	☐	☐	☐	5
Formatting	☐	☐	☐	☐	☐	6
Graphics	☐	☐	☐	☐	☐	7
Binary coded decimal	☐	☐	☐	☐	☐	8
Buffer storage	☐	☐	☐	☐	☐	9
Housekeeping (factors needed in documentation)	☐	☐	☐	☐	☐	10
Library functions (program storage)	☐	☐	☐	☐	☐	11
Structured programming	☐	☐	☐	☐	☐	12
Subroutines	☐	☐	☐	☐	☐	13
Desk-top debugging	☐	☐	☐	☐	☐	14
Linear programming	☐	☐	☐	☐	☐	15
Decision tables	☐	☐	☐	☐	☐	16
Data Flow diagrams	☐	☐	☐	☐	☐	17
Other _____						

STARTING PERSONNEL SHOULD KNOW APPLICATIONS OF:

Time-sharing (on-line)	☐	☐	☐	☐	☐	18
Batch	☐	☐	☐	☐	☐	19
Working (inquiry)	☐	☐	☐	☐	☐	20
Decision making	☐	☐	☐	☐	☐	21
Other _____						

ELECTRONIC FILES

STARTING PERSONNEL SHOULD HAVE KNOWLEDGE OF:

	CRITICAL	NECESSARY	POSSIBLE	UNNECESSARY	UNCERTAIN	
File Organization:	☐	☐	☐	☐	☐	22
Sequential	☐	☐	☐	☐	☐	23
Random	☐	☐	☐	☐	☐	24
Index	☐	☐	☐	☐	☐	25
Data Base, implementation and utilization	☐	☐	☐	☐	☐	26
Data File utilization	☐	☐	☐	☐	☐	27
Computer Output Microfilm	☐	☐	☐	☐	☐	28
Microfiche	☐	☐	☐	☐	☐	29
Micrographics, implementation and utilization	☐	☐	☐	☐	☐	30
File retrieval techniques	☐	☐	☐	☐	☐	31
Record protection	☐	☐	☐	☐	☐	32
Reprographics	☐	☐	☐	☐	☐	33
Control cycles	☐	☐	☐	☐	☐	34
Cost analysis	☐	☐	☐	☐	☐	35
Disposition	☐	☐	☐	☐	☐	36
Forms management	☐	☐	☐	☐	☐	37
Methods of electronic indexing	☐	☐	☐	☐	☐	38
File security	☐	☐	☐	☐	☐	39
File back-up techniques	☐	☐	☐	☐	☐	40
Other _____						

TELECOMMUNICATIONS

ENTRY-LEVEL PERSONNEL SHOULD HAVE KNOWLEDGE OF:
(Data Transmission Terminal Equipment)

Visual display terminals	☐	☐	☐	☐	☐	41
Punched card transmission terminals	☐	☐	☐	☐	☐	42
Teledata transmitter–receiver	☐	☐	☐	☐	☐	43
Telespeed tape-to-tape	☐	☐	☐	☐	☐	44
Punched tape transmission terminals	☐	☐	☐	☐	☐	45
Magnetic tape transmission	☐	☐	☐	☐	☐	46
Computer transmission control terminals	☐	☐	☐	☐	☐	47
Facsimile terminals	☐	☐	☐	☐	☐	48
Microcomputer as transmitter–receiver	☐	☐	☐	☐	☐	49
Other _____						

ENTRY-LEVEL PERSONNEL SHOULD HAVE KNOWLEDGE OF:
(Electronic Mail)

Data communications	☐	☐	☐	☐	☐	50
Communicating word processors	☐	☐	☐	☐	☐	51
TELEX/TWX	☐	☐	☐	☐	☐	52
Facsimile	☐	☐	☐	☐	☐	53
Message switching	☐	☐	☐	☐	☐	54
Other _____						

ENTRY-LEVEL PERSONNEL SHOULD HAVE KNOWLEDGE OF:

Centrex	☐	☐	☐	☐	☐	55
Teleconferencing	☐	☐	☐	☐	☐	56
Remote data processing	☐	☐	☐	☐	☐	57
Security	☐	☐	☐	☐	☐	58
Data-phone	☐	☐	☐	☐	☐	59
Other _____						

WORD PROCESSING

ENTRY-LEVEL PERSONNEL SHOULD BE ABLE TO UTILIZE MATERIALS AND/OR RELATED SOURCES:

	CRITICAL	NECESSARY	POSSIBLE	UNNECESSARY	UNCERTAIN	
Composition skills:						
Oral	☐	☐	☐	☐	☐	60
Written (including grammar & vocabulary)	☐	☐	☐	☐	☐	61
Keyboarding:						
Speed	☐	☐	☐	☐	☐	62
Accuracy	☐	☐	☐	☐	☐	63
Proofreading performance	☐	☐	☐	☐	☐	64
Time utilization & organizational ability	☐	☐	☐	☐	☐	65
Business English (grammar, spelling, etc.)	☐	☐	☐	☐	☐	66
Form letters	☐	☐	☐	☐	☐	67
Alphanumeric sorting	☐	☐	☐	☐	☐	68
List processing	☐	☐	☐	☐	☐	69
Floppy disk	☐	☐	☐	☐	☐	70

Other _____

ENTRY-LEVEL PERSONNEL SHOULD HAVE KNOWLEDGE OF:

	CRITICAL	NECESSARY	POSSIBLE	UNNECESSARY	UNCERTAIN	
Formatting & editing	☐	☐	☐	☐	☐	71
Justification	☐	☐	☐	☐	☐	72
Machine transcription	☐	☐	☐	☐	☐	73
Split keyboarding	☐	☐	☐	☐	☐	74
Intelligent copiers	☐	☐	☐	☐	☐	75
Shared-logic word processors	☐	☐	☐	☐	☐	76
Stand-alone processors	☐	☐	☐	☐	☐	77
Administrative activities	☐	☐	☐	☐	☐	78
Mag Card	☐	☐	☐	☐	☐	79

Other _____

Average number of personnel in word processing _____ 80

PLEASE CHECK EQUIPMENT YOU HAVE:

Stand-alone word processors	☐	1
Shared-logic word processors	☐	2

Please list type/s of computer system/s used by your organization

SIZE	MANUFACTURER	MODEL	USAGE: Word Processing	USAGE: Data Processing
_____	_____	_____	☐	☐
_____	_____	_____	☐	☐
_____	_____	_____	☐	☐
_____	_____	_____	☐	☐

DEMOGRAPHIC FACTORS

Type of Company — Service ☐ Trade ☐ Manufacturing ☐ Government ☐ 3

Other _____

Number of employees — Under 250 ☐ 250-500 ☐ 500-1000 ☐ Over 1000 ☐ 4

Approximate number of data processing personnel _____ 5

Company-sponsored training program — Yes ☐ No ☐ 6

(THE FOLLOWING INFORMATION IS NEEDED TO MAKE A COPY OF THE SUMMARY AVAILABLE TO YOU; BUT NO NAMES OF COMPANIES OR INDIVIDUALS WILL BE USED IN THE STUDY.

OPTIONAL:

Name of company _____

Title of person responding _____

Address _____

Please sand summary of report. Yes ☐ No ☐