A TASK INVENTORY OF COMPUTER PROGRAMMERS IN OKLAHOMA CITY, OKLAHOMA

By

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CHAPTER I

INTRODUCTION

Since its inception as a calculating device, the computer has undergone four generations of changes. Each generation is marked by differences in the skills of individuals needed to operate, program, and design different computer systems (1).

The businessmen of today have a tendency to consider the computer as an essential element for handling general accounting procedures, inventory, and other jobs too complicated or involved to handle by non-computer systems. As a result, computer systems are becoming more important, and they are being used in wide areas of government and industry. Additionally, the marked demand for computer systems will mean newer and perhaps radical differences in the computer systems to suit the emerging industry needs (2).

The constant improving and modifying of computer systems from technological changes has hindered the educational institutions from keeping the computer programmer training program current. Training needed by computer programmers must be kept current in order to insure jobs for the graduates of the different schools.

Statement of the Problem

The problem of the study was to identify the tasks performed by computer programmers in the performance of their jobs.

The problem is complicated by the following factors:

1. Lack of information necessary to determine the types of computer hardware and software available and being used by industry.

2. Lack of knowledge concerning what computer applications different employers are using.

Purpose of the Study

This study was concerned with determining the tasks performed by business and governmental computer programmers in the performance of their job in Oklahoma City.

Research Questions

The following research questions were considered:

1. What are some of the tasks that computer programmers perform in their technical role?

2. What effect does the number of years in the programming field have to do with the performance of each task?

3. What effect does the size of the computer programmers have to do with the performance of each task?

Need for the Study

The results of the study could be useful in planning computer programmer training programs and evaluating present training programs.

Assumptions

For the purpose of this study, the following assumptions were made:

1. The respondents' perceptions of various tasks and professional information would be alike so that the responses could be totaled.

2. The computer programmers used as a sample were representative of the total population of computer programmers.

3. The instrument is valid because of its prior usage.

4. The data is ordinal in nature and can be ranked.

5. The response from the respondents is representative of the total population.

Definitions

For better understanding of this study, the following definitions are needed:

Computer programmer - a person who solves a predefined problem on a computer.

DPMA - Data Processing Management Association.

Duty - activities for which the job incumbent is responsible. Specific duties used in this study are listed in Table I.

Task - activities required in the performance of a duty.

CHAPTER II

REVIEW OF THE LITERATURE

Due to rapid innovations in technology, the electronic computer has undergone its fourth generation since 1944. Each succeeding generation of computer is faster, cheaper, and smaller than the previous generation. With the rapid and sometimes radical improvements in computers, educators are hard-pressed to keep their data processing curriculum current so that graduates will have the work skills needed for employment in data processing careers. William G. Carr (3), the executive secretary for the National Education Association, aptly stated that

> Rapid technological change confronts society and the schools with problems which cannot be swept under the rug. For example how to prepare the new generation for greater excellence in the complex world of science and technology (p. 1).

However even with the rapid technological change, three questions arise: (1) why should the schools be concerned with the technological change; (2) what possible benefits can come about from the school easing technological change in place; and (3) what is the solution to school's role in educating students. The above questions were answered by Blackstone (4) when he stated that

> Both business and schools have a great stake in improving the quality of workers who enter the business world. Cooperative effort between business and schools will help improve the students effectiveness, and reduce the expense of employing workers and maintaining office training

> procedures for them. More effective educational programs can come only as we know more about the facts of office employment. We must determine specific demands of business (p. 26).

or perhaps, Smith (8)

> Business education teachers should maintain a liason with computer manufacturers and industry to be informed of training needs so necessary instruction may be included in the secondary school program (p. 255).

The results of a liason between schools and industry can be favorable in producing the job skills that a graduate needs for employment. A liason can be advisory committees or surveys of industries needs for the particular speciality. Yet, a liason between schools and industry is not the final solution. The graduates of a data processing school may still have trouble with their careers. Weber of the American Federation of Information Processing Societies (AFIPS) has revealed that of 170,000 graduates trained by primary sources for the computer user market, only 120,000 have entered the labor force. He implied that the graduates were not adequately trained (6).

Since many of the data processing graduates are not entering the labor force, the business firms are facing a shortage of trained data processing employees. This is requiring the different businesses to employ college graduates with management potential, and then on-the-job training is provided in the particular specialty to the graduate (7, 8).

One of the reasons for the inadequate training of the data processing graduates and the shortage of trained data processing employees can be attributed to the time lag effect. MacDonald (9) was concerned with the lack of teaching materials and the time lag

between data processing education and the first data processing job. He gave the following reasons for the time lag:

> 1. The lack of clarity as to the training to be offered in data processing.
>
> 2. The lack of available data processing equipment.
>
> 3. The shortage of competent data processing teachers.
>
> 4. The absence of suitable teaching materials for data processing instruction (p. 27).

For the purpose of this study, only the first reason will be considered.

Similar Studies

Several studies have been attempted to determine what type of training is needed for a computer programmer. One of the more notable studies was by Bangs et al. (10). Briefly, he attempted

> . . . to determine the implications of intergrated data processing in offices for the development of curricula in office occupations and the preparations of office workers. The purpose of the study was to provide guidance for schools in evaluating programs then in existence and for establishing new programs (p. 1).

The study included 176 school systems and 353 businesses throughout the United States. Questionnaires and interviews were used for data collection.

The computer programmers interviewed indicated that the duties performed by a programmer are: designing flow charts, debugging programs, analyzing the flow of data, coding programs, making diagrams, analyzing systems, operating the computer, making a test sample routine, and punching cards.

From the findings of the study, it was indicated that schools are not meeting the needs in training personnel for many job opportunities in data processing areas of business. It was recommended that research is needed in making an indepth analysis of course offerings in the field of data processing.

Perhaps an analysis of course offerings is needed. The question arises how can the course or curriculum content be determined? Toyne (11) attempted to answer the question. She did a study to

> . . . evaluate public and private schools to determine whether they are preparing students to meet the needs of data processing managers in Georgia. The purpose was to gather data that would provide performance-based behavioral objectives for data processing curriculum development. The study was done to provide an insight into the conceptual and motor skills required for entry-level employment in the electronic data processing industry compared with present curricula offerings in public and private educational institutions. To collect data for the purpose of the study, a questionnaire was sent to data processing managers, public schools, and private schools. The data was analyzed using Kruskall-Wallis one-way analysis of variance test and the Nemenyi and Dunn post-hoc analyses of multiple comparisons.
>
> Findings and Conclusions: Public and private schools teach the 36 tasks identified by data processing managers to the level of skill and knowledge considered necessary for the entry-level position of programmers. There is a significant difference between the needs of managers inside and outside the Greater Metropolitan Atlanta Area who desire programmers to operate the computer system. In conclusion, it suggested that programmers need more training in the areas of conceptual skills. Computer installations use programming languages which are primarily designed to handle data processing activities rather than solving scientific programs. Even though core capacity and geographic locations differ, managers inside and outside the Greater Metropolitan Atlanta Area require the same skills of their entry-level personnel (abstract).

Another approach to identifying the course or curriculum content needed for data processing curriculum development is by a task inventory. Task inventories have been used successfully by several

investigators, notably Tinnell (12) and Borcher et al. (13). The technique of a task inventory was identified by Tinnell (12) as

> 1. identifying duties assigned to or expected of an occupational incumbent.
>
> 2. identifying the tasks which constitute satisfactory performance of the duty.
>
> 3. administering the task inventory to successful job incumbents.
>
> 4. analyzing the incumbents' reports to identify appropriate training experiences (p. 12).

This technique of task inventory was done in a study by Borcher et al. (13). Briefly, the objectives of the study were as follows:

> 1. To construct and validate a task inventory for the business data processing occupational area
>
> 2. To determine the frequency of performance of tasks by incumbent workers in data processing occupational area
>
> 3. To determine the relative time spent in performing specific tasks by incumbent workers in data processing occupational area
>
> 4. To validate job descriptions for the job titles in the data processing occupational area
>
> 5. To determine what tasks are common to all jobs in the data processing occupational area (p. 2).

The task inventory was sent to 38 data processing installations to the head of the installations for them to distribute to their employees. The inventory had 445 tasks and 14 duty areas for five job descriptions which were: managers, system personnel, programmers, computer console operators, and data converting operators.

The study did state that the duties and tasks are primarily related to positions held, size, and type of computer installation in which they are employed. However, they did not include how the duties and tasks are affected by the aforementioned factors in the analysis

of the data.

The results of the study indicate that a high percentage of computer programmers will perform tasks related to programming computers. Additionally duties connected to computer console operators, systems personnel, and data processing managers and supervisors will be performed by computer programmers, though not at the high percentage as those tasks in programming computer duty area.

CHAPTER III

METHODOLOGY

Introduction

This study was conducted among selected computer programmers in Oklahoma City. This chapter reports the methodology used in the study, and it can be divided into four steps: (1) selection of the population; (2) development of the instrument; (3) collection of the data; and (4) analysis of the results.

Selection of the Population

The first step in this study was to identify the data processing installations in Oklahoma City. Two lists of names and addresses from the DPMA mailing list and a study by Cruce (14) were combined to avoid duplication of names and addresses. After the combining, a list of 155 names and addresses were derived. Oklahoma City was used because it is the main large city located in the center of Oklahoma.

Development of the Instrument

The instrument used for data collection consisted of three parts. The first part was the professional information. The professional information had two questions: (1) the number of years the respondent had worked as a computer programmer and (2) the number of full-time

equivalent computer programmers at the particular installation.

The second part was nine duty areas and 201 tasks as given in Table I. The duty areas and tasks were developed from a study by Borcher et al. (13).

TABLE I

DUTIES AND THE NUMBER OF TASKS

Duty	Number of Tasks
1. Performing Systems Programming	9
2. Programming Computers	74
3. Operating Automatic Data Processing Equipment	33
4. Supervising Programming	18
5. Supervising Data Service Functions	13
6. Performing Data Processing Functions	15
7. Performing Data Systems Analysis	10
8. Designing Data Systems	17
9. Performing Feasibility Studies (Pilot Projects)	12
TOTAL	201

The last part consisted of each duty area listed where the respondent could indicate how many hours were spent on each duty.

It was decided not to ask the respondents for the amount of relative time spent on each task from a conversation with R. W. Tinnell. The principle reasons for not including a time scale for each task were: the similarity of this study with the study by Borcher et al. (13); Tinnell (12) stated that the respondents had difficulties in understanding a relative time scale; and a better return rate in terms of returned completed questionnaires.

The completed instrument was reviewed by three members of the Oklahoma State University Technical Education faculty and two computer programmers to insure clarity and appropriateness.

The final instrument as used is given in Appendix A.

Collection of the Data

The data processing installations in Oklahoma City were mailed an introductory letter (see Appendix B) and a data collecting instrument (see Appendix A) to the manager of data processing for each installation in mid-April, 1976. The manager was then asked to pass the instrument to a computer programmer and to have the computer programmer complete the instrument. The computer programmer would return the instrument in the stamped self-addressed envelope included with the instrument. It was decided that this method of data collection would help in assuring a reasonable return rate.

A second mail-out was made two weeks later to those non-responding respondents.

The returns were considered to be complete by mid-May, 1976.

Analysis of the Data

The data from the returned instruments was encoded and key-punched on computer cards. Since the data was analyzed by the SPSS program intergrated into the Oklahoma State University Computer Center, a large variety of analyses became possible. In answering the research questions of this study, a combination of three ways was chosen.

In the professional information, the mean, mode, and range were calculated for the number of years the respondent had worked as a computer programmer and the number of full-time equivalent programmers employed at the data processing installation.

A simple frequency count of the number of responses to each task and the responses were ranked. This would indicate those tasks done by the greatest number of computer programmers.

The number of years the respondent had worked as a computer programmer was grouped in upper, middle, and lower third. The number of full-time computer programmers in the installation was also grouped into upper, middle, and lower third. The reason the two items in professional information were grouped was to avoid empty frequencies in the cells as a result of cross tabulation. The two items in professional information were then cross tabulated with each task. The cross tabulation was analyzed with Chi-square to determine if any significant response patterns existed.

CHAPTER IV

RESULTS

Return Rates

The purpose of this study was concerned with determining the tasks performed by business and governmental computer programmers in Oklahoma City. A task inventory (see Appendix A) and a cover letter (see Appendix B) were sent to 155 data processing installations in Oklahoma City during April, 1976. By mid-May, 58 returned instruments had been received. Fourteen data processing managers reported that no computer programmers were employed at the installation, and nine installations had moved leaving no forwarding address. These installations were excluded from the study leaving 58 or 43.9 percent of 132 data processing installations.

Data Summary

Respondents in the study were asked to supply the number of years that they had worked as a computer programmer and the number of full-time equivalent computer programmers employed at the data processing installation. The respondents were also asked to check each task that they performed on their present job. The results of the data analyses will be discussed in the following paragraph.

In the number of years worked as a computer programmer (see

Table II), the years ranged from one year to 20 years. The largest number of respondents had worked 10 years (12.1 percent). The mean for the respondents was 6.5 years of computer programmer experience. Six respondents did not fill in the number of years employed as a computer programmer.

The respondents were asked to indicate the number of computer programmers in the installation (see Table III). The number of computer programmers ranged from one computer programmer to 700 programmers. The largest number of respondents stated there was one programmer (17.2 percent) at the installation. The mean for the respondents was 38.1 programmers working at the installation. Six respondents did not indicate how many computer programmers were employed at the installation.

The number of respondents who responded that they performed a task were counted. The number of respondents who did each task ranged from zero to 57 responses. The frequency and percent of respondents who performed each task is listed in Table IV.

Response Rankings

Since a ranking of all the tasks would be lengthly, only the upper and lower quarter of the tasks performed are ranked (see Table V). A pattern arises from the ranking. The tasks in the upper quarter are all from the programming computers duty area. The tasks from the lowest quarter are mainly from the other duty areas with the exception of three tasks from the programming computer duty area which were at the bottom of the list.

An interesting result arises when the upper quarter of ranked

TABLE II

RESPONDENTS' RESPONSES TO NUMBER OF YEARS WORKED AS A COMPUTER PROGRAMMER

Number of Years Employed	Frequency of Respondents	Percent of Respondents
1	4	7.7
2	5	9.6
3	6	11.5
4	5	9.6
5	4	7.7
6	2	3.9
7	5	9.6
8	6	11.5
9	2	3.9
10	7	13.5
11	1	1.9
13	3	5.8
18	1	1.9
20	1	1.9
TOTAL	52	100.0

TABLE III

RESPONDENTS' RESPONSES TO NUMBER OF PROGRAMMERS EMPLOYED AT AN INSTALLATION

Number of Programmers at an Installation	Frequency of Respondents	Percent of Respondents
1	10	19.2
2	6	11.6
3	9	17.3
5	5	9.7
6	2	3.9
7	1	1.9
8	2	3.9
9	1	1.9
12	2	3.9
13	1	1.9
15	2	3.9
22	1	1.9
30	1	1.9
38	1	1.9
67	1	1.9
96	1	1.9
97	1	1.9
140	1	1.9
160	1	1.9
200	1	1.9
250	1	1.9
700	1	1.9
TOTAL	52	100.0

TABLE IV

DUTIES AND THE DATA FOR EACH TASK

		Responses	Percent
	I Performing Systems Programming		
1.	Analyze and debug manufactured software	16	27.6
2.	Develope maintenance procedures for the operating systems	14	24.1
3.	Diagnose and correct operating system component errors	15	25.9
4.	Maintain back-up procedures for the operating system	20	34.5
5.	Perform system generation, establish source and relocatable library sizes, etc.	26	44.8
6.	Plan, coordinate and install new hardware and software	22	37.9
7.	Select various components to be used in creating new operating system	15	25.9
8.	Write programs to print tapes, punch cards, or read cards	40	69.0
9.	Write system monitor programs	5	8.6
	II Programming Computers		
1.	Adapt programs written in symbolic language to different computer configuration	21	36.2
2.	Analyze applications to select appropriate utility programs and subroutines	39	67.2
3.	Analyze computer inputs prior to test run and follow-up	41	70.7
4.	Analyze core dumps, evaluate and recommend solutions	37	63.8
5.	Analyze programming documentation	46	79.3
6.	Analyze programs, evaluations, reviews or reports for problem identification	45	77.6
7.	Audit computer inputs after test run and follow-up	46	79.3
8.	Code computer applications using a reports program generator	21	36.2
9.	Code disk sort programs	29	50.0
10.	Code programs utilizing more than one language	34	58.6
11.	Code routine computer programs	54	93.1
12.	Code software utility programs	24	41.4
13.	Code tape sort programs	17	29.3
14.	Confer with functional area personnel to prepare specific routines	44	75.9
15.	Coordinate with functional areas on programming aspects of new systems being devised and reports being developed	40	69.0
16.	Debug programs	57	98.3
17.	Design Assembly programs	17	29.3
18.	Design or lay out disk storage formats	44	75.9
19.	Design or lay out drum storage formats	5	8.6
20.	Design or lay out magnetic tape storage formats	42	72.4
21.	Design or lay out paper tape storage formats	1	1.7
22.	Design random access formulas	17	29.3
23.	Design report formats	50	86.2
24.	Design software formats	18	31.0
25.	Design tape input/output formulas	15	25.9
26.	Design tape or disk sort programs	17	29.3
27.	Desk check or debug programs after assembly or compilation	56	96.6
28.	Desk check programming logic for punching errors prior to assembly or compilation	42	72.4
29.	Determine most applicable programming language for problems	30	51.7
30.	Develop flow charts for handling source data by off-line support equipment	25	43.1
31.	Develop computer operating instruction, technical bulletins	31	53.4
32.	Develop operation procedures for programming	27	46.6
33.	Develop program logic charts for machine routines	31	53.4
34.	Develop subroutines	39	67.2
35.	Develop systems for collecting, processing, and storing data	43	74.1
36.	Edit computer programs for effective use of auxiliary storage media	25	43.1
37.	Edit computer programs for efficient use of logical and arithmetical components	19	32.8
38.	Edit computer programs for effective use of memory	27	46.6
39.	Exploit parallel processing capabilities to gain operational effectiveness	25	43.1
40.	Extract figures needed for special analysis and studies	38	65.5
41.	Incorporate standard routines into programs	44	75.9
42.	Incorporate utility routines into programs	36	62.1
43.	Integrate planned routines with the overall programming systems (segmenting)	25	43.1
44.	Insert changes into existing programs	54	93.1
45.	Isolate and correct programming errors discovered during testing	54	93.1
46.	Lay out memory maps	6	10.3
47.	Maintain and update library of program and processing documentation	45	77.6

TABLE IV (Continued)

	II Programming Computers - Continued		
48.	Maintain library of documentation of general purpose and utility programs	29	50.0
49.	Manually convert numbers from one number system to another	23	39.7
50.	Manually translate computer programs from symbolic language to assembly language	7	12.1
51.	Patch computer programs	35	60.3
52.	Perform analog programming	0	0.0
53.	Perform program analysis	39	67.2
54.	Perform real time programming	23	39.7
55.	Perform systems analysis to meet requirements of company functions	47	81.0
56.	Prepare console operator's run books	37	63.8
57.	Prepare control card sheets for utility or library programs	24	41.4
58.	Prepare detail flow charts	37	63.8
59.	Prepare documentation including formats and layouts for input and output media	49	84.5
60.	Prepare general and detailed flow charts	44	75.9
61.	Prepare instructions for operation of on-line peripheral equipment	23	39.7
62.	Prepare testing instructions and control test data for use of console operator during test audits	22	37.9
63.	Prepare programming block diagrams	29	50.0
64.	Read and interpret regulations, manuals, or administrative orders	45	77.6
65.	Recommend corrections of modifications to systems	44	75.9
66.	Review existing routines for applicability of new techniques	31	53.4
67.	Revise computer programs	55	94.8
68.	Select appropriate utility programs	43	74.1
69.	Test new computer programs	52	89.7
70.	Test revised computer programs	53	91.4
71.	Write console program manual	12	20.7
72.	Write programs for inquiry routines	31	53.2
73.	Write programs for local one-time applications	49	84.5
74.	Write programs for data generation for program testing	30	51.7
	III Operating Automatic Data Processing Equipment		
1.	Analyze job steps to determine data recovery points	30	51.7
2.	Analyze machine operation through use of messages received from the equipment	31	53.4
3.	Analyze machine operation through use of conditions displayed	25	43.1
4.	Change sequence of jobs run to cut down operational steps	28	48.3
5.	Determine cause of machine stops and malfunctions	30	51.7
6.	Load programs and data cards	36	62.1
7.	Locate tapes in storage media or tape library	22	37.9
8.	Maintain card files (source object. etc.)	34	58.6
9.	Operate card reader	36	62.1
10.	Operate console	35	60.3
11.	Operate interpreter	22	37.9
12.	Operate key punch machines or verifiers	41	70.7
13.	Operate magnetic tape unit	24	41.4
14.	Operate remote terminals	25	43.1
15.	Operate sorter	26	44.8
16.	Operate time sharing system terminal	17	29.3
17.	Perform card-to-printer operation	38	65.5
18.	Perform compilation or assembly	42	72.4
19.	Perform debugging runs	40	69.0
20.	Perform on-the-job training of operators	27	46.6
21.	Perform punched card-to-tape conversion operation	21	36.2
22.	Perform tape-to-tape operation (copy)	31	53.4
23.	Prepare special carriage control tapes	27	46.6
24.	Prepare control decks	33	56.9
25.	Record time log for unscheduled maintenance	10	17.2
26.	Review processing steps before job is put on computer	28	48.3
27.	Schedule sequence of users during shift for effective organization of runs	7	12.1
28.	Screen reports, cards, or programs for obvious errors and initiate corrections	23	39.7
29.	Select and mount disks	24	41.4
30.	Select and mount tapes	24	41.4
31.	Set up computer for operation	30	51.7
32.	Update current source programs	43	74.1
33.	Update systems programs (object run tapes-ORT's)	20	34.5

TABLE IV (Continued)

	IV Supervising Programming		
1.	Analyze program evaluations, reviews or reports for problem identification	24	41.4
2.	Conduct on-the-job training in programming	30	51.7
3.	Coordinate programming requirements with machine configuration	30	51.7
4.	Coordinate with functional areas on programming aspects of reports being developed	33	56.9
5.	Coordinate with operations on preparation of computer operating instructions	38	65.6
6.	Coordinate with systems designers on programming aspects of new systems	37	63.8
7.	Coordinate with systems designers on programming aspects of reports being developed	35	60.3
8.	Design operating systems	13	22.4
9.	Develop local operating procedures for programming	23	39.7
10.	Develop programming aids	23	39.7
11.	Develop program test and maintenance systems	16	27.6
12.	Establish controls for program card decks and magnetic files	17	29.3
13.	Establish programming priorities	26	44.8
14.	Evaluate work performance of programmers	14	24.1
15.	Follow up programs being developed at local level	25	43.1
16.	Initiate procedures for preparation of input to computer	30	51.7
17.	Maintain instruction worksheets for operational programs	20	34.5
18.	Orient newly assigned programmers	22	37.7
	V Supervising Data Service Functions		
1.	Analyze company operations to determine where most significant improvements can be made	21	36.2
2.	Analyze data processed for modification of reports	30	51.7
3.	Analyze data processed to make sure that desired information is obtained	35	60.3
4.	Analyze documentation for completeness and accuracy	35	60.3
5.	Coordinate with programmers and systems personnel on matters of joint interest	30	51.7
6.	Develop computer operating instructions	33	56.9
7.	Develop standards and factors for use in management control systems	10	17.2
8.	Document new computer processes	27	46.6
9.	Inspect methods used to process data	19	32.8
10.	Maintain lists of recurring reports	21	36.2
11.	Order data automation supplies and equipment	12	20.7
12.	Perform periodic inspections of data automation activities	8	13.8
13.	Review machine run reports for accuracy	20	34.5
	VI Performing Data Processing Functions		
1.	Arrange reruns and special checks to proof final output	36	62.1
2.	Audit data systems of functional area reports	15	25.9
3.	Check error with consultant, correct and resubmit	28	48.3
4.	Compare data arithmetically with predetermined control totals	34	58.6
5.	Contact functional areas for submission and evaluation of data	24	41.4
6.	Maintain files of reports, regulations, or directives pertaining to data systems	22	37.9
7.	Maintain suspense file for controlled reports	12	20.7
8.	Plan programming workloads, make work assignments, and organize skills	21	36.2
9.	Prepare recommendations for improved efficiency in operations	30	51.7
10.	Process requests for new or revised reports	33	56.9
11.	Read and interpret regulations, manuals, or administrative orders	35	60.3
12.	Review completed programs for accuracy	37	63.8
13.	Review detail flow charts prior to preparation of programs	24	41.4
14.	Schedule development of programs	22	37.9
15.	Supervise and edit documentation of programs	20	34.5
	VII Performing Data Systems Analysis		
1.	Develop directives pertaining to data systems	19	32.8
2.	Evaluate data for duplications and unnecessary requirements	35	60.3

TABLE IV (Continued)

	VII Performing Data Systems Analysis - Continued		
3.	Evaluate data for relationship of output to source documents	35	60.3
4.	Evaluate file contents and sequences	41	70.7
5.	Evaluate problem areas adaptable to modification	37	63.8
6.	Identify data interface requirements	30	51.7
7.	Identify problem areas in the system	38	65.5
8.	Identify source documents, internal files and final reports	40	69.0
9.	Perform initial analysis of requests for systems studies	35	60.3
10.	Update and review schedules and program networks	18	31.0
	VIII Designing Data Systems		
1.	Audit mechanized listing to check systems	12	20.7
2.	Control system input and output	22	37.9
3.	Coordinate with programmers and functional areas to establish new applications	31	53.4
4.	Design or modify data interface requirements	25	43.1
5.	Design punched card media layouts	39	67.2
6.	Design punched tape media layouts	18	31.0
7.	Design systems to include tabular forms and visual displays	28	48.3
8.	Determine processing, storage, and retrieval techniques	40	69.0
9.	Inspect system flow	33	56.9
10.	Monitor updating of format and data items	21	36.2
11.	Prepare data automation proposals (DAP)	18	31.0
12.	Prepare documentation for systems flow charts	37	63.8
13.	Prepare or analyze data for testing new systems	37	63.8
14.	Prepare systems block diagrams	29	50.0
15.	Recommend changes in data automation proposals to person of prime responsibility	28	48.3
16.	Review technological developments in communications or teleprocessing requirements	22	37.9
17.	Review technological development in processing, storage, and information retrieval	28	48.8
	IX Performing Feasibility Studies (Pilot Projects)		
1.	Brief functional area personnel on limits of data processing	26	44.8
2.	Coordinate integration of systems with functional area	27	46.6
3.	Coordinate with functional areas to determine output requirements	36	62.1
4.	Determine input/output characteristics and media for functional area	34	58.6
5.	Determine size and time elements of processing runs	32	55.2
6.	Develop standard data elements and codes for functional areas	28	48.3
7.	Evaluate use of existing systems of programs for pilot projects	26	44.8
8.	Investigate communications and teleprocessing requirements for integration of data systems and processing	20	34.5
9.	Prepare computer logic diagrams	21	36.2
10.	Prepare detailed document flow diagram	25	43.1
11.	Prepare feasibility study on present system to determine need for new system	20	34.5
12.	Prepare recommendations for size and capacity of proposed electronic data processing equipment	17	29.3

TABLE V

TOP AND BOTTOM QUARTER OF THE RANKING OF THE NUMBER OF RESPONDENTS WHO REPORTED PERFORMING EACH TASK

	Duty - Task	Number Responding	Percent
II-16	Debug programs	57	98.3
II-27	Desk check or debug programs after assembly	56	96.6
II-67	Revise computer programs	55	94.8
II-11	Code routine computer programs	54	93.1
II-44	Insert changes into existing programs	54	93.1
II-45	Isolate and correct programming errors discovered during testing	54	93.1
II-70	Test revised computer programs	53	91.4
II-69	Test new computer programs	52	89.7
II-33	Design report formats	50	86.2
II-73	Write programs for local one-time applications	49	84.5
II-59	Prepare documentation including formats and layouts for input and output media	49	84.5
II-55	Perform system analysis to meet requirements of company functions	47	81.0
II-7	Audit computer inputs after test run and follow-up	46	79.3
II-5	Analyze programming documentation	46	79.3
II-74	Write programs for data generation for program testing	45	77.6
II-6	Analyze programs, evaluations, reviews or reports for problem identification	45	77.6

TABLE V (Continued)

	Duty - Task	Number Responding	Percent
II-65	Recommend corrections of modifications to systems	44	75.9
II-60	Prepare general and detailed flow-charts	44	75.9
II-41	Incorporate standard routines into programs	44	75.9
II-18	Design or layout disk storage formats	44	75.9
II-14	Confer with functional area personnel to prepare specific routines	44	75.9
I-3	Diagnose and correct operating system components errors	15	25.9
I-7	Select various components to be used in creating new operating system	15	25.9
II-35	Design tape input/output formula	15	25.9
VI-2	Audit data systems of functional area reports	15	25.9
I-2	Develop maintenance procedures for the operating system	14	24.1
IV-14	Evaluate work performance of programmers	14	24.1
IV-8	Design operating systems	13	22.4
II-71	Write console program manual	12	20.7
V-11	Write data automation supplies and equipment	12	20.7
VI-7	Maintain suspense file for controlled reports	12	20.7
VIII-I	Audit mechanized listing to check systems	12	20.7

TABLE V (Continued)

	Duty - Task	Number Responding	Percent
III-25	Record time log for unscheduled maintenance	10	17.2
V-7	Develop standards and factors for use in management control systems	10	17.2
V-12	Perform periodic inspections of data	8	13.8
II-50	Manually translate computer programs	7	12.1
III-27	Schedule sequence of users during shift for effective organization of runs	7	12.1
II-46	Layout memory maps	6	10.3
I-9	Write systems monitor programs	5	8.6
II-19	Design or lay out tape storage formats	1	1.7
II-52	Perform analog programming	0	0.0

tasks is examined. More respondents indicate that they perform program review and modification rather than writing computer programs.

Chi-Square Analyses

The number of years of computer programming experience was grouped into three categories: the lower was one through three years experience; the middle was four through nine; and the upper was 10 through 20 years experience. The number of programmers was also grouped into three categories: the lower was one and two programmers; the middle was three through nine programmers; and the upper was 12 through 700 programmers.

Cross tabulation was performed with the three categories of each the number of years experience as a computer programmer and the number of computer programmers in the installation to each task to determine if there was any significant difference in tasks performed.

In Table VI, the majority of the significant tasks are from the programming computers duty area. Three of the significant tasks from the programming computers duty are concerned with testing and revising computer programs, and these tasks will probably be performed by the computer programmer during their first years as a programmer. The tasks in the other duty areas will have increased usage in the later years of a computer programmers experience. Three tasks from the programming computer duty area will increase with the number of years experience, and these tasks are concerned with coding programs utilizing more than one language, preparing programming block diagrams, and determining most applicable programming languages for problems.

TABLE VI

RESULTS OF CROSS TABULATION BETWEEN YEARS OF COMPUTER PROGRAMMING EXPERIENCE AND TASKS PERFORMED

	Tasks	Significance
I-8	Write programs to print tapes, punch cards, or read cards	* c
II-10	Code programs utilizing more than one language	* a
II-29	Determine most applicable programming language for problems	* * * c
II-44	Insert changes into existing programs	* b
II-63	Prepare programming block diagrams	* a
II-67	Revise computer programs	* d
II-69	Test new computer programs	* d
II-70	Test revised computer programs	* d
III-23	Prepare special carriage control tapes	* a
IV-18	Orient newly assigned programmers	* a
V-11	Order data automation supplies and equipment	* a
VIII-14	Prepare systems block diagrams	* * a
VIII-16	Review technological developments in communications or teleprocessing requirements	* a

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

a. Performance of a task will increase with number of years experience.

b. Number of years experience will not effect performance of a task.

c. Performance of a task will increase in the middle years.

d. Performance of a task will decrease with the number of years experience.

The results of the cross tabulation between the number of computer programmers in the data processing installation and each task (see Table VII) reveal a pattern in those tasks which were determined significant. Those significant tasks in the programming computer duty area are mainly performed in the larger installations. The significant tasks in the operating of automatic data processing equipment are mainly performed by the smaller installations.

TABLE VII

RESULTS OF CROSS TABULATION BETWEEN NUMBER OF PROGRAMMERS AT AN INSTALLATION AND PERFORMANCE OF A TASK

	Tasks	Significance
II-10	Code programs utilizing more than one language	* * a
II-20	Design or lay out magnetic tape storage formats	* a
II-29	Determine most applicable programming language for problem	* * a
II-33	Develop program logic charts for machine routines	* a
II-36	Edit computer programs for effective use of auxiliary storage media	* b
II-42	Incorporate utility routines into programs	* a
II-49	Manually convert numbers from one number system to another	* a
III-3	Analyze machine operation through use of conditions displayed	* * d
III-6	Load programs and data cards	* d
III-8	Maintain card files (source object, etc.)	* d
III-12	Operate key punch machines or verifiers	* d
III-15	Operate sorter	* d
III-16	Operate time sharing system terminal	* a

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

a. Task associated with larger organizations.

b. Task associated with small and larger organizations

c. Task associated with middle size organizations.

d. Task associated with smaller organizations.

TABLE VII (Continued)

	Tasks	Significance
III-17	Perform card-to-printer operation	* d
III-18	Perform compilation or assembly	* d
III-19	Perform debugging runs	* d
III-28	Screen reports, cards, or programs for obvious errors and initiate corrections	* b
III-31	Set up computer for operation	* d
IV-8	Design operating systems	* d
IV-9	Develop local operating procedures for programming	* b
IV-11	Develop program test and maintenance systems	* * b
IV-18	Orient newly assigned programmers	* a
V-8	Document new computer processes	* d
VI-10	Process requests for new or revised reports	* b
VI-13	Review completed programs for accuracy	* * d
VIII-14	Prepare systems block diagrams	* a

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

a. Task associated with larger organizations

b. Task associated with small and larger organizations.

c. Task associated with middle size organizations.

d. Task associated with smaller organizations.

CHAPTER V

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

Summary

The purpose of this study was to determine the tasks performed by business and governmental computer programmers in Oklahoma City. To fulfill the purpose of this study, the following questions were considered:

1. What are some of the tasks that computer programmers perform in their technical role?

2. What effect does the number of years in the programming field have to do with the performance of each task?

3. What effect does the size of the computer installation in terms of number of computer programmers have to do with the performance of each task?

The manager of data processing for each installation was sent a cover letter and a data collecting instrument which they were to pass on to a computer programmer for completion and return to the manager. The manager would return the completed instrument for analyses. A follow-up on the non-respondents was sent two weeks later. The rate from the returned instruments was 43.9 percent.

Summary of the Findings

The following is a list of the findings:

1. More programmers perform tasks which are concerned with programming computers than tasks connected with other duties.

2. The tasks which are most often performed are concerned with program review and modification.

3. Three tasks will be performed by a computer programmer in early years as a programmer. These tasks are associated with testing and revising computer programs.

4. The tasks which were significant in the duties other than programming computers will probably increase in usage with the computer programmer's years of experience.

5. Three tasks in programming computer duty area which are associated with coding programs utilizing more than one language, preparing block diagrams, and determining most applicable programming language will probably increase in usage with the computer programmer's years of experience.

6. The significant tasks in the programming computers duty area are primarily done by the larger installations.

7. The significant tasks in the operating automatic data processing equipment are generally done by the smaller installations.

Conclusions

Based upon the findings of this study, the following conclusions were made:

1. The tasks performed by a computer programmer can be

determined. The greatest number of respondents are concerned with program review and modification.

2. The years of programming experience does seem to have a significant effect on the performance of certain tasks. The entry-level programmer needs to have a knowledge of testing and revising computer programs.

3. The number of computer programmers in a data processing installation can have a significant effecc on the tasks performed. In a larger installation, the computer programmer will have more tasks in the programming computer duty area; but in small installations, the computer programmer will usually do more tasks in the operating automatic data processing equipment duty area.

Recommendations

The following recommendations are made:

1. Designers of a data processing curriculum need to place substantial emphasis in areas concerning computer review and modification.

2. A data processing curriculum needs to have "hands on" experience with a computer since the entry-level computer programmer will need to know how to test and revise computer programs.

3. The individual school should conduct surveys to determine what size of data processing installations that they will be supplying graduates for in order to determine the content of individual school's training program.

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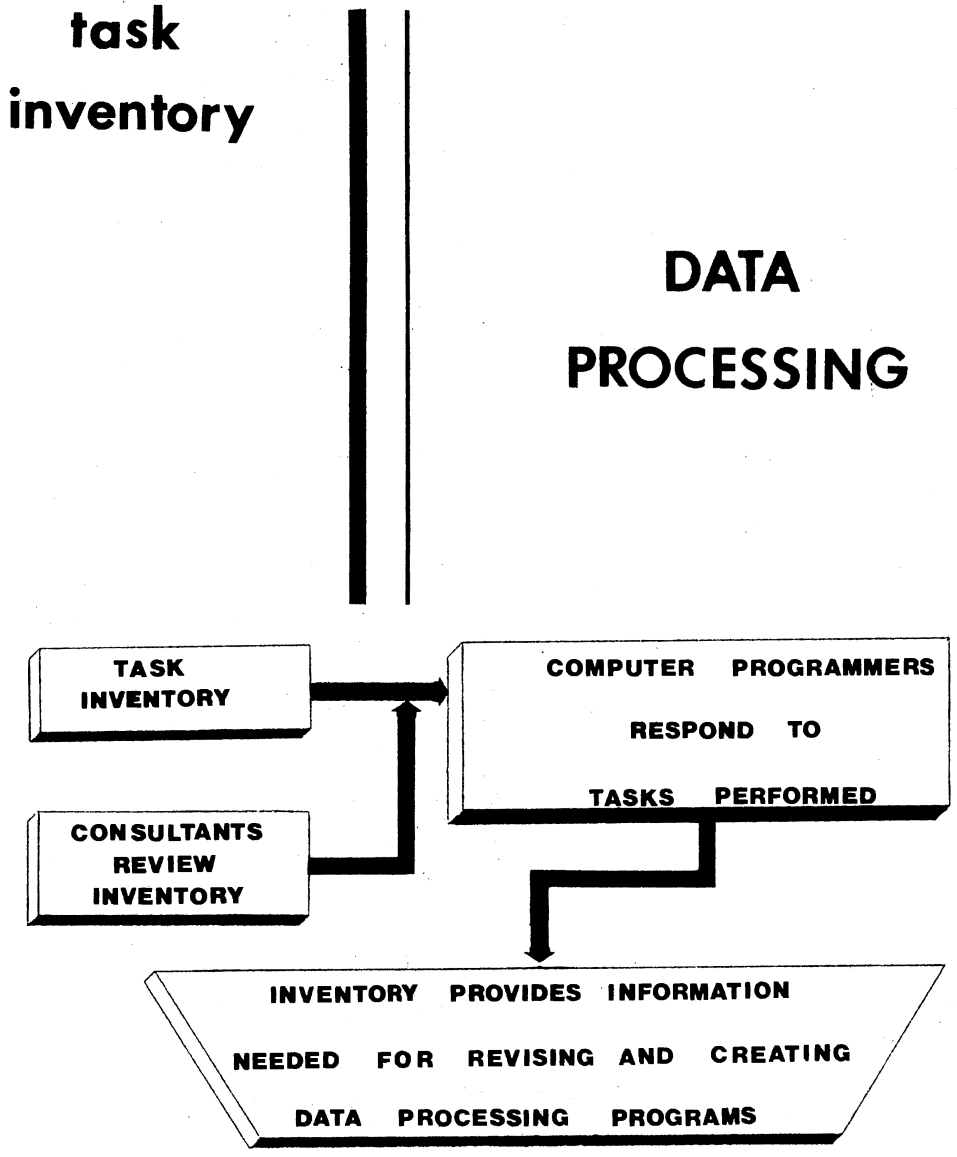
APPENDIXES

APPENDIX A

DATA COLLECTION INSTRUMENT


task
inventory
DATA
PROCESSING
TASK
INVENTORY
CONSULTANTS
REVIEW
INVENTORY
COMPUTER PROGRAMMERS
RESPOND TO
TASKS PERFORMED
INVENTORY PROVIDES INFORMATION
NEEDED FOR REVISING AND CREATING
DATA PROCESSING PROGRAMS

Oklahoma State University

SCHOOL OF OCCUPATIONAL AND ADULT EDUCATION

STILLWATER, OKLAHOMA, 74074
CLASSROOM BUILDING 406
(405) 372-6211, EXT. 6287

DEAR COMPUTER PROGRAMMER:

I NEED YOUR HELP. I AM CONDUCTING A STUDY THAT I BELIEVE YOU WILL FIND INTERESTING AND HELPFUL TO YOUR PROFESSION. I AM ATTEMPTING TO ASSEMBLE AND VALIDATE A COMPLETE LIST OF DUTIES AND TASKS PERFORMED BY COMPUTER PROGRAMMERS. THE INFORMATION CAN BE VERY HELPFUL IN PLANNING COMPUTER PROGRAMMER TRAINING PROGRAMS.

WHAT I AM ASKING FOR IS ABOUT ONE-HALF HOUR OF YOUR TIME. PLEASE FILL IN THE PROFESSIONAL INFORMATION REQUESTED. THEN FOR THE REMAINDER OF THE INVENTORY, YOU SHOULD CHECK EACH TASK THAT YOU DO IN THE PERFORMANCE OF YOUR DUTIES. ADDITIONALLY, YOU SHOULD WRITE IN ANY TASK WHICH YOU DO WHICH IS NOT LISTED. LASTLY YOU SHOULD ESTIMATE THE AMOUNT OF TIME SPENT ON EACH DUTY DURING A TYPICAL WORK WEEK.

I AM DEPENDING ON YOU TO PROVIDE US WITH THE NECESSARY INFORMATION FOR IMPROVING DATA PROCESSING PROGRAMS. FOR YOUR PERSONAL INFORMATION AN ABSTRACT OF THE STUDY WILL BE SENT TO EACH PERSON WHO COMPLETES THE TASK INVENTORY. PLEASE COMPLETE AND RETURN THE INVENTORY TODAY.

SINCERELY,

James Callison

JAMES CALLISON

JC/kp

GENERAL INSTRUCTIONS

COMPLETING THE TASK INVENTORY IS VERY EASY AND IT REQUIRES ABOUT ONE-HALF HOUR TO DO. FIRST FILL IN THE PROFESSIONAL INFORMATION REQUESTED ON THIS PAGE.

SECONDLY READ EACH OF THE TASK STATEMENTS AND PLACE A CHECK MARK (✓) IN THE COLUMN CHECK FOR EACH TASK WHICH YOU PERFORM ON YOUR PRESENT JOB.

AT THE END OF ANY SECTION WRITE IN ANY TASKS YOU DO WHICH ARE NOT LISTED.

ON THE LAST PAGE OF THE INVENTORY YOU SHOULD RATE EACH DUTY BY AN ESTIMATE OF THE AMOUNT OF TIME SPENT DURING A TYPICAL WORK WEEK.

LASTLY, PLEASE RETURN THE WHOLE BOOKLET TO THE MANAGER PROMPTLY.

PROFESSIONAL INFORMATION

HOW MANY YEARS HAVE YOU WORKED AS A COMPUTER PROGRAMMER?

_____

HOW MANY FULL-TIME EQUIVALENT COMPUTER PROGRAMMERS DOES YOUR FIRM EMPLOY?

_____

3

DATA PROCESSING TASK INVENTORY

Listed below is a duty and the tasks which it includes, check all tasks which you perform. Add any tasks you do which are not listed.	Check ✓ If Done
-DUTY- PERFORMING SYSTEMS PROGRAMMING -TASK-	
1. Analyze and debug manufactured software	
2. Develop maintenance procedures for the operating system	
3. Diagnose and correct operating system component errors	
4. Maintain back-up procedures for the operating system	
5. Perform system generation, establish source and relocatable library sizes, etc.	
6. Plan, coordinate and install new hardware and software	
7. Select various components to be used in creating new operating system	
8. Write programs to print tapes, punch cards, or read cards	
9. Write system monitor programs	
Please list any additional tasks:	

4

DATA PROCESSING TASK INVENTORY

Listed below is a duty and the tasks which it includes, check all tasks which you perform. Add any tasks you do which are not listed.	Check ✓ If Done
-DUTY- PROGRAMMING COMPUTERS -TASK-	
1. Adapt programs written in symbolic language to different computer configuration	
2. Analyze applications to select appropriate utility programs and subroutines	
3. Analyze computer inputs prior to test run and follow-up	
4. Analyze core dumps, evaluate and recommend solutions	
5. Analyze programming documentation	
6. Analyze programs, evaluations, reviews or reports for problem identification	
7. Audit computer inputs after test run and follow-up	
8. Code computer applications using a reports program generator	
9. Code disk sort programs	
10. Code programs utilizing more than one language	
11. Code routine computer programs	
12. Code software utility programs	
13. Code tape sort programs	
14. Confer with functional area personnel to prepare specific routines	
15. Coordinate with functional areas on programming aspects of new systems being devised and reports being developed	
16. Debug programs	
17. Design Assembly programs	
18. Design or lay out disk storage formats	
19. Design or lay out drum storage formats	
20. Design or lay out magnetic tape storage formats	

5

DATA PROCESSING TASK INVENTORY

Listed below is a duty and the tasks which it includes, check all tasks which you perform. Add any tasks you do which are not listed.	Check ✓ If Done
-DUTY- PROGRAMMING COMPUTERS -TASK-	
21. Design or lay out paper tape storage formats	
22. Design random access formulas	
23. Design report formats	
24. Design software formats	
25. Design tape input/output formulas	
26. Design tape or disk sort programs	
27. Desk check or debug programs after assembly or compilation	
28. Desk check programming logic for punching errors prior to assembly or compilation	
29. Determine most applicable programming language for problems	
30. Develop flow charts for handling source data by off-line support equipment	
31. Develop computer operating instruction, technical bulletins	
32. Develop operation procedures for programming	
33. Develop program logic charts for machine routines	
34. Develop subroutines	
35. Develop systems for collecting, processing, and storing data	
36. Edit computer programs for effective use of auxiliary storage media	
37. Edit computer programs for efficient use of logical and arithmetical components	
38. Edit computer programs for effective use of memory	
39. Exploit parallel processing capabilities to gain operational effectiveness	
40. Extract figures needed for special analysis and studies	

6

DATA PROCESSING TASK INVENTORY

Listed below is a duty and the tasks which it includes, check all tasks which you perform. Add any tasks you do which are not listed.	Check ✓ If Done
-DUTY- PROGRAMMING COMPUTERS -TASK-	
41. Incorporate standard routines into programs	
42. Incorporate utility routines into programs	
43. Integrate planned routines with the overall programming systems (segmenting)	
44. Insert changes into existing programs	
45. Isolate and correct programming errors discovered during testing	
46. Lay out memory maps	
47. Maintain and update library of program and processing documentation	
48. Maintain library of documentation of general purpose and utility programs	
49. Manually convert numbers from one number system to another	
50. Manually translate computer programs from symbolic language to assembly language	
51. Patch computer programs	
52. Perform analog programming	
53. Perform program analysis	
54. Perform real time programming	
55. Perform systems analysis to meet requirements of company functions	
56. Prepare console operator's run books	
57. Prepare control card sheets for utility or library programs	
58. Prepare detail flow charts	

7

DATA PROCESSING TASK INVENTORY

Listed below is a duty and the tasks which it includes, check all tasks which you perform. Add any tasks you do which are not listed.	Check ✓ If Done
-DUTY- PROGRAMMING COMPUTERS -TASK-	
59. Prepare documentation including formats and layouts for input and output media	
60. Prepare general and detailed flow charts	
61. Prepare instructions for operation of on-line peripheral equipment	
62. Prepare testing instructions and control test data for use of console operator during test audits	
63. Prepare programming block diagrams	
64. Read and interpret regulations, manuals, or administrative orders	
65. Recommend corrections of modifications to systems.	
66. Review existing routines for applicability of new techniques	
67. Revise computer programs	
68. Select appropriate utility programs	
69. Test new computer programs	
70. Test revised computer programs	
71. Write console program manual	
72. Write programs for inquiry routines	
73. Write programs for local one-time applications	
74. Write programs for data generation for program testing	
Please list any additional tasks:	

8

DATA PROCESSING TASK INVENTORY

Listed below is a duty and the tasks which it includes, check all tasks which you perform. Add any tasks you do which are not listed.	Check ✓ If Done
-DUTY- OPERATING AUTOMATIC DATA PROCESSING EQUIPMENT -TASK-	
1. Analyze job steps to determine data recovery points	
2. Analyze machine operation through use of messages received from the equipment	
3. Analyze machine operation through use of conditions displayed	
4. Change sequence of jobs run to cut down operational steps	
5. Determine cause of machine stops and malfunctions	
6. Load programs and data cards	
7. Locate tapes in storage media or tape library	
8. Maintain card files (source object. etc.)	
9. Operate card reader	
10. Operate console	
11. Operate interpreter	
12. Operate key punch machines or verifiers	
13. Operate magnetic tape unit	
14. Operate remote terminals	
15. Operate sorter	
16. Operate time sharing system terminal	
17. Perform card-to-printer operation	
18. Perform compliation or assembly	
19. Perform debugging runs	
20. Perform on-the-job training of operators	
21. Perform punched card-to-tape conversion operation	
22. Perform tape-to-tape operation (copy)	
23. Prepare special carriage control tapes	
24. Prepare control decks	

DATA PROCESSING TASK INVENTORY

Listed below is a duty and the tasks which it includes, check all tasks which you perform. Add any tasks you do which are not listed.	Check ✓ If Done
-DUTY- OPERATING AUTOMATIC DATA PROCESSING EQUIPMENT -TASK-	
25. Record time log for unscheduled maintenance	
26. Review processing steps before job is put on computer	
27. Schedule sequence of users during shift for effective organization of runs	
28. Screen reports, cards, or programs for obvious errors and initiate corrections	
29. Select and mount disks	
30. Select and mount tapes	
31. Set up computer for operation	
32. Update current source programs	
33. Update systems programs (object run tapes-ORT's)	
Please list any additional tasks:	

10

DATA PROCESSING TASK INVENTORY

Listed below is a duty and the tasks which it includes, check all tasks which you perform. Add any tasks you do which are not listed.	Check ✓ If Done
-DUTY- SUPERVISING PROGRAMMING -TASK-	
1. Analyze program evaluations, reviews or reports for problem identification	
2. Conduct on-the-job training in programming	
3. Coordinate programming requirements with machine configuration	
4. Coordinate with functional areas on programming aspects of reports being developed	
5. Coordinate with operations on preparation of computer operating instructions	
6. Coordinate with systems designers on programming aspects of new systems	
7. Coordinate with systems designers on programming aspects of reports being developed	
8. Design operating systems	
9. Develop local operating procedures for programming	
10. Develop programming aids	
11. Develop program test and maintenance systems	
12. Establish controls for program card decks and magnetic files	
13. Establish programming priorities	
14. Evaluate work performance of programmers	
15. Follow up programs being developed at local level	
16. Initiate procedures for preparation of input to computer	
17. Maintain instruction worksheets for operational programs	
18. Orient newly assigned programmers	

11

DATA PROCESSING TASK INVENTORY

Listed below is a duty and the tasks which it includes, check all tasks which you perform. Add any tasks you do which are not listed.	Check ✓ If Done
-DUTY- SUPERVISING DATA SERVICE FUNCTIONS -TASK-	
1. Analyze company operations to determine where most significant improvements can be made	
2. Analyze data processed for modification of reports	
3. Analyze data processed to make sure that desired information is obtained	
4. Analyze documentation for completeness and accuracy	
5. Coordinate with programmers and systems personnel on matters of joint interest	
6. Develop computer operating instructions	
7. Develop standards and factors for use in management control systems	
8. Document new computer processes	
9. Inspect methods used to process data	
10. Maintain lists of recurring reports	
11. Order data automation supplies and equipment	
12. Perform periodic inspections of data automation activities	
13. Review machine run reports for accuracy	
Please list any additional tasks	

12

DATA PROCESSING TASK INVENTORY

Listed below is a duty and the tasks which it includes, check all tasks which you perform. Add any tasks you do which are not listed.	Check ✓ If Done
-DUTY- PERFORMING DATA PROCESSING FUNCTIONS -TASK-	
1. Arrange reruns and special checks to proof final output	
2. Audit data systems of functional area reports	
3. Check error with consultant, correct and resubmit	
4. Compare data arithmetically with predetermined control totals	
5. Contact functional areas for submission and evaluation of data	
6. Maintain files of reports, regulations, or directives pertaining to data systems	
7. Maintain suspense file for controlled reports	
8. Plan programming workloads, make work assignments, and organize skills	
9. Prepare recommendations for improved efficiency in operations	
10. Process requests for new or revised reports	
11. Read and interpret regulations, manuals, or administrative orders	
13. Review completed programs for accuracy	
14. Review detail flow charts prior to preparation of programs	
15. Schedule development of programs	
16. Supervise and edit documentation of programs	
Please list any additional tasks:	

DATA PROCESSING TASK INVENTORY

Listed below is a duty and the tasks which it includes, check all tasks which you perform. Add any tasks you do which are not listed.	Check
-DUTY- PERFORMING DATA SYSTEMS ANALYSIS -TASK-	✓ If Done
1. Develop directives pertaining to data systems	
2. Evaluate data for duplications and unnecessary requirements	
3. Evaluate data for relationship of output to source documents	
4. Evaluate file contents and sequences	
5. Evaluate problem areas adaptable to modification	
6. Identify data interface requirements	
7. Identify problem areas in the system	
8. Identify source documents, internal files and final reports	
9. Perform initial analysis of requests for systems studies	
10. Update and review schedules and program networks	
Please list any additional tasks:	

14

DATA PROCESSING TASK INVENTORY

Listed below is a duty and the tasks which it includes, check all tasks which you perform. Add any tasks you do which are not listed.	Check ✓ If Done
-DUTY- DESIGNING DATA SYSTEMS -TASK-	
1. Audit mechanized listing to check systems	
2. Control system input and output	
3. Coordinate with programmers and functional areas to establish new applications	
4. Design or modify data interface requirements	
5. Design punched card media layouts	
6. Design punched tape media layouts	
7. Design systems to include tabular forms and visual displays	
8. Determine processing, storage, and retrieval techniques	
9. Inspect system flow	
10. Monitor updating of format and data items	
11. Prepare data automation proposals (DAP)	
12. Prepare documentation for systems flow charts	
13. Prepare or analyze data for testing new systems	
14. Prepare systems block diagrams	
15. Recommend changes in data automation proposals to person of prime responsibility	
16. Review technological developments in communications or teleprocessing requirements	
17. Review technological development in processing, storage, and information retrieval	
Please list any additional tasks:	

15

DATA PROCESSING TASK INVENTORY

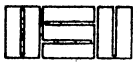
Listed below is a duty and the tasks which it includes, check all tasks which you perform. Add any tasks you do which are not listed.	Check ✓ If Done
-DUTY- PERFORMING FEASIBILITY STUDIES (PILOT PROJECTS) -TASK-	
1. Brief functional area personnel on limits of data processing	
2. Coordinate integration of systems with functional area	
3. Coordinate with functional areas to determine output requirements	
4. Determine input/output characteristics and media for functional area	
5. Determine size and time elements of processing runs	
6. Develop standard data elements and codes for functional areas	
7. Evaluate use of existing systems of programs for pilot projects	
8. Investigate communications and teleprocessing requirements for integration of data systems and processing	
9. Prepare computer logic diagrams	
10. Prepare detailed document flow diagram	
11. Prepare feasibility study on present system to determine need for new system	
12. Prepare recommendations for size and capacity of proposed electronic data processing equipment	
Please list any additional tasks:	

HOW MANY ESTIMATED HOURS DO YOU SPEND ON EACH DUTY DURING THE WEEK? PLEASE RATE EACH DUTY BY ESTIMATING THE NUMBER OF HOURS SPENT DURING A TYPICAL WORK WEEK.

	HOURS				
DUTY	0-9	10-19	20-29	30-39	over 40
Performing Systems Programming					
Programming Computers					
Operating Automatic Data Processing Equipment					
Supervising Programming					
Supervising Data Service Functions					
Performing Data Processing Functions					
Performing Data Systems Analysis					
Designing Data Systems					
Performing Feasibility Studies					

APPENDIX B

LETTERS OF TRANSMITTAL



Oklahoma State University

SCHOOL OF OCCUPATIONAL AND ADULT EDUCATION

STILLWATER, OKLAHOMA, 74074
CLASSROOM BUILDING 406
(405) 372-6211, EXT. 6287

April 16, 1976

Dear Data Processing Manager:

I need your help. I am conducting a study that I believe will be helpful to your profession. I am attempting to validate a complete list of duties and tasks performed by computer programmers.

The information will be supplied on request to institutions who wish to revise and update existing data processing curriculums or to create new curriculums.

What I am asking for is about one-half hour of one of your computer programmers time. Please give the task inventory to a computer programmer for completion. When they are through, have the computer programmer return the task inventory to you, and you can return the inventory to me in the stamped, self-addressed envelope.

You will notice that the inventory booklet is numbered. The number is only for my use in follow-up and in accounting for the booklet. To protect the privacy of opinions, company names will not be used in any of the summary statements.

I am depending on you to provide me with the necessary information for improving data processing programs. Please have the computer programmer complete and return the task inventory today.

Sincerely,

James Callison

JC/kp
Enclosure

Oklahoma State University

SCHOOL OF OCCUPATIONAL AND ADULT EDUCATION

STILLWATER, OKLAHOMA, 74074
CLASSROOM BUILDING 406
(405) 372-6211, EXT. 6287

April 30, 1976

Dear Data Processing Manager:

I need your help! A few weeks ago I mailed you a task inventory which will supply information needed to revise and update existing data processing curriculums or to create new curriculums.

If your completed task inventory is already in the mail I appreciate it. If you have misplaced it, or it never reached you, please give the enclosed copy to one of your computer programmers. Then have the computer programmer fill it out and return to you, you can then return the completed task inventory to me.

I will send you an abstract of the study when your task inventory is returned, and the data from the task inventory is tabulated.

I very much appreciate your help in collecting this information.

Sincerely,

James J. Callison

JJC/kp
Enclosure

VITA

James Jon Callison

Candidate for the Degree of

Master of Science

Thesis: A TASK INVENTORY OF COMPUTER PROGRAMMERS IN OKLAHOMA CITY, OKLAHOMA

Major Field: Technical Education

Biographical:

Personal Data: Born in San Pedro, California, October 21, 1952, the son of James F. and Neva N. Callison.

Education: Graduated from Eisenhower High School, Lawton, Oklahoma, 1970; received Bachelor of Science degree in Biology from Cameron University in 1974; completed requirements for the Master of Science degree at Oklahoma State University in July, 1976.

Professional Experience: Presently employed as a Graduate Assistant, Oklahoma State University, 1975-1976.

Professional Organizations: Oklahoma Technical Society, National Association of Industrial and Technical Teacher Educators, Phi Delta Kappa, Red Red Rose.