Twenty-three instructors participated in an 8-week summer institute to develop their technical competency to teach the second year of a 2-year Technical Education Computer Science Program. Instructional material covered the following areas: (1) compiler languages and systems design, (2) cost studies, (3) business organization, (4) advanced programming, and (5) operating systems. In evaluating the results of the institute, the Programmer's Aptitude Test by the Psychological Corporation, New York, New York, was given at the beginning to establish each participant's aptitude in areas of numeric, verbal, and abstract reasoning relevant to programming. In addition, pretest and post-test scores were determined in the following areas: (1) business organization, (2) cost accounting, (3) systems, (4) COBOL, and (5) FORTRAN. Class schedules, textbooks, and a teacher-participant evaluation are included. Success of the institute led to the following conclusions: (1) Competent data processing and computer programming instructors, including teachers from other disciplines, can be trained in two summer institutes, and (2) Their success can be predicted from aptitude tests. Periodic follow-up instruction to teachers is recommended. Phase I of this study is described in ED 016 066. (MU)

FINAL REPORT

Project Number 7-0822
Grant Number OEG 1-7-070822-3486

SUMMER INSTITUTE TO TRAIN DATA PROCESSING
TEACHERS FOR THE NEW OKLAHOMA STATE-WIDE COMPUTER SCIENCE SYSTEM, PHASE II

Francis Tuttle, Ed.D., State Director
Vocational Education
and
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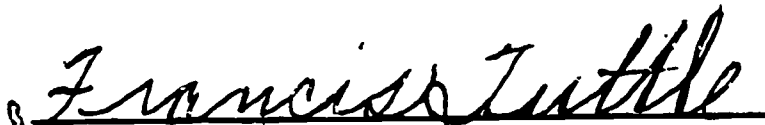Division of Technical Education
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SUMMARY

The basic purpose of the institute was to develop the technical competencies in the participant instructor to teach the second year Technical Education Computer Science Program in the Oklahoma State-Wide Data Processing System. Whereas Phase I, conducted in 1966, was designed to qualify the participants to teach the first year of the two year program.

The instructional portion of the project covered the following subject matter areas: Compiler Languages and Systems Design, Cost Studies, Business Organization, Advanced Programming and Operating Systems.

Twenty-three participants were selected to take part in the institute. Twenty of these had taught in the state-wide system or in another data processing program. Three participants desired to enroll for the institute without stipends or subsistance from the project and were placed in positions of teaching within the system as expansion occurred.

One would have to evaluate the institute as being very successful after a study of participants weekly evaluation and the placement record of the first graduates of the two-year state-wide data processing system. The overall evaluation of the institute indicates that 91.3% of the participants rated each weeks presentation as adequate to very adequate. The only week in which the students indicated the subject matter was inadequate was the eighth (8th) week and only two participants indicated such. More than 66% of the first graduating class were placed in industry full time or on a part-time basis while continuing their education.

It is recommended that additional instruction be given to the teachers in seminars or field trips to keep them up-to-date in a rapidly expanding industry. This could be used to help teachers in details of their instruction program, to make recommended curriculum changes, to meet the needs of local industry, to introduce teachers to new systems and in general to up-grade teacher's competencies.

INTRODUCTION

The objectives of this project were four fold:

1. To conduct an eight-week summer institute (Phase II) for the further preparation of post-high school data processing technology teachers in data communications. Twenty participants will be selected and trained in those areas necessary to be competent to teach the second year curriculum in the Oklahoma State-Wide Computer Science System. The eight-week summer institute (Phase II), while incorporating other objectives and procedures stated herein, will train data-communications teachers in advanced levels of: cost accounting and business organization; compiler languages; advanced assembly language programming; executive systems data communications; and systems analysis and design.

2. To develop among prospective data processing teachers a practical philosophy of technical education and an understanding of the technician's role in an automated and industrialized society.

3. To establish and define requirements for admission of applicants to the teacher training institute.

4. To establish criteria for measuring an individual's aptitude, interests and ability for teaching data processing technology in post-high school technical education programs.

The major objective of this project was to develop the technical competency within the institute participants to teach the second year of the two (2) year Technical Education Computer Science Program whereas Phase I, conducted in 1966, was designed to qualify the participants to teach the first year of the two-year program. An eight week institute conducted from June 5, 1967, through July 28, 1967, in which twenty two (22) in-state and one (1) out-of-state data processing teachers participated.

The complex features of the Oklahoma State-Wide Data Processing System necessitates the use of highly trained instructional personnel. Personnel who are qualified to teach in data processing technology programs are very rare and their recruitment is most difficult. Technical education programs of this nature designed for the education and preparation of computer program systems analysis technicians, require instructors who possess the characteristics of a good teacher as well as solid background in computer operation and programming and analysis techniques.

This state-wide computer science system allows the local schools to offer an extremely high level program at a reasonable cost even though the local school's computing facilities is basically a terminal computing facility. Its capability will be greatly expanded due to the back-up of data communications through the data center. The local schools are somewhat limited by the background of their instructional staff; however, the data center provides a complete library facility of varieties and types of programs in all phases of industrial production in business application. It also provides support personnel with an extremely high industrial and professional background to the local schools. The data center is capable of sending information to the local school within seconds once the request

is received from the local school. The schools also have an advantage of utilizing the data center for instruction as many times per week as can be scheduled. It is planned that many of these schools will have the capabilities to transport students two or three times per month into the Oklahoma City area to utilize the data center facilities. This provides instruction on an extremely large and complex computing facility. It also allows instruction in how data communications actually operates and what function the data communication has in the total data communication network. The local school's data communication computer facilities is only one aspect of the total data communication system and the student's knowledge of the operating system in the data center and actual hands on experience in the data center provides knowledge and experiences that are of great value once the student enters the field of data processing. The data center also provides for instruction in the specialized programming languages such as FORTRAN, COBOL and other new programming languages as developed. Individually schools do not have the capabilities of teaching these languages without the data center. COBOL and FORTRAN languages will be a necessity in the training of programmers to fill positions in the present field of data processing.

The state-wide computer science system presently has ten (10) institutions cooperating and will eventually accommodate twelve (12) to sixteen (16) data processing technology programs in colleges, junior colleges, technical institutes, and area schools throughout the State of Oklahoma. Each school is provided with a remote data communications computer with combination printing, reading, punching, data communications and computing capabilities, and a six deck tape drive and controller system. This equipment will operate on-line as a data communications system. The local schools also have printing, reading, punching, processing, and computing capabilities off-line but to a limited degree.

The system uses half-duplex voice grade private lines to connect the local school's data processing equipment to the data center in Oklahoma City. The data center computer has a high speed processing unit with 65,000 units of data storage, decimal arithmetic, floating point arithmetic, storage protection, console typewriter, and selector channel. This computing system also has mass random access storage, magnetic tapes, data adapter units, data communications receiving terminals, optical scanning, and auxilary supporting unit record equipment.

The type of computer science system described herein has been established in Oklahoma and eliminates the need for duplicating high cost equipment for each local school and allows each school greater computing capabilities through direct access to the data center. This system minimizes obsolescence because the local school's program will always be as up-to-date as the data center's computing system which will be continually updated. The schools will therefore have the facilities to provide for the student's instruction on the latest and most effective equipment available at a nominal cost.

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PROCEDURES USED

The instructional portion of the project was accomplished with great satisfaction. Appendix I contains a tabular form of the curriculum and a list of textbooks and references used in the institute. The description of the courses taught are:

I.   Compiler Languages and Systems Design - A two college credit hour course covering Fortran IV, COBOL, and Systems Design.

II. Cost Studies - A one college credit hour course designed to teach essentials of Cost Accounting, Income Statements, Cost Accounting Structures and Cost Studies.

III. Business Organization - A one college credit hour course covering types of business, organization levels, functional departments and financing.

IV. Advanced Programming - A two college credit hour course which includes a study of computer organization (comparison of equipment), programming a tape station, programming random access devices, job timing and program testing.

V.   Operating Systems - A two college credit hour course which includes a detailed study of input-output control systems, utility programs, sort-merge programs, processors and executive controls.

Every effort was made during the institute to instill within the partici-
pants a practical philosophy of technical education and the technician's
role in an automated and industrialized society. The technician is serving
a new position in many industries. Therefore, his needs are different than
the professional and the educational program which he follows needs to be
different than the professional. New theories, principles and methods
which were taught during the institute were applied to industry and business
operations as the technician programmer or systems analyst will be expected
to use them.

After consulting with two hundred sixty one (261) businesses and in-
dustries, who hire data processing and computer programming personnel,
the conclusion was reached to select participants into Phase I who had
a teaching background in mathematics or business and accounting.

Requests were made that the administrators and supervisors of the
participating institutions within the State and the State Supervisors of
Vocational Education in the surrounding states, submit names of indi-
viduals with this background and who were interested in teaching computer
science for consideration as a participant in the institute. Selections
were made after careful evaluation of applicant's former teaching experi-
ences, ability, and desire to teach in computer sciences.

The participants were instructed in the areas of: operating system,
compiler languages and systems, business organization, cost studies, and
advanced programming. These offerings were determined by evaluating
responses from the 1966 participants regarding their expression of needs

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in relation to the curriculum which should be taught in a two-year program.
The curriculum subject matter was determined after a survey of businesses
and industries who hire data processing and computer programming personnel
and after the responses were evaluated by educators involved in programs
of data processing and computer programming.

RESULTS

In order to achieve the stated objectives as listed in the intro-
duction of this report, various tests were used in an attempt to reveal
information relative to the participant's aptitude and abilities in
numeric, verbal and abstract reasoning, business organization, cost ac-
counting, COBOL, Systems and FORTRAN. Details of the tests are available
in "Quarterly Interim Report Number 2, Project Number 7-0822".

Numeric, Verbal and Abstract Reasoning Aptitudes:

The "Programmer's Aptitude Test" by The Psychological Corporation,
New York, New York, was administered to the participants at the beginning
of the institute. This test was given for the purpose of establishing
each individual participant's aptitude in areas of numeric, verbal, and
abstract reasoning relevant to programming.

The scores for numeric aptitude ranged from a low of 20 to a high
of 40, with an average of 33.5 for the group.

The scores for verbal aptitude ranged from a low of 17 to a high
of 47, with an average of 35.7 for the group.

The scores for abstract reasoning aptitude ranged from a low of 30
to a high of 49, with an average of 40.7 for the group.

Business Organization Pre-Test and Post-Test Scores:

The pre-test scores for knowledge of business organization ranged
from a low of 3 to a high of 14, with an average of 9.8 for the group.
The post-test scores in this area ranged from a low of 12 to a high of
22, with an average of 17.6 for the group.

The post-test average score for the group represents an increase of
84.37% over the pre-test average score.

Cost Accounting Pre-Test and Post-Test Scores:

The pre-test scores for knowledge of cost accounting ranged from a
low of 9 to a high of 27, with an average of 16.7 for the group. The
post-test scores in this area ranged from a low of 15 to a high of 28,
with an average of 23.7 for the group.

The post-test average score for the group represents an increase of
41.9% over the pre-test average score.

COBOL Pre-Test and Post-Test Scores:

The pre-test scores for knowledge of COBOL ranged from a low of 0
to a high of 35, with an average of 21.3 for the group. The post-test
scores in this area ranged from a low of 38 to a high of 47, with an
average of 43.9 for the group.

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The post-test average score for the group represents an increase of 106% over the pre-test average score.

Systems Pre-Test and Post-Test Scores:

The pre-test scores for knowledge of systems ranged from a low of 0 to a high of 13, with an average of 7.3 for the group. The post-test scores in this area ranged from a low of 6 to a high of 13, with an average of 11.1 for the group.

The post-test average score for the group represents an increase of 52% over the pre-test average score.

FORTRAN Pre-Test and Post-Test Scores:

The pre-test scores for knowledge of FORTRAN ranged from a low of 0 to a high of 78, with an average of 30.4 for the group. The post-test scores in this area ranged from a low of 16 to a high of 81, with an average of 65.4 for the group.

The post-test average score for the group represents an increase of 116.6% over the pre-test average score.

The results of the tests did provide valuable information regarding the participants aptitudes, abilities and understanding relevant to programing and areas of instruction planned for the institute. The test scores provided a means for establishing at what level the instruction should begin in each area while also indicating the subject matter areas which would need to be stressed more than other areas.

The post-test scores indicated that the greatest achievements resulting from the instruction received in the institute were in the areas of FORTRAN and COBOL with respective increased average scores of 116.6% and 106% over that of the pre-test scores. The least change brought about by the instruction, as indicated by the scores, was the area of cost accounting with a 41.9% average increase. Business organization and systems had increased average scores of 54.37% and 52% respectively.

A statistical analysis was run to see if there was an appreciable difference in the success of participants with a mathematics background and participants with other backgrounds. Appendix II contains the raw scores of the participants in numerical, verbal and abstract reasoning and pre-test and post-test score in the five subject matter areas covered in the institute. The backgrounds of the participants seemed to be such that they could be divided as follows: those who had their B.S. in Math; those who had their B.S. in Accounting; and those who had their B.S. in some other field. After looking at means (and partly because of the small numbers and similarities) the decision was made that those with accounting or other backgrounds be lumped into one group. The analysis, then, is based on only two groups: "Math" and "Other".

The first comparison made was to see if the institute input had any influence on the members in terms of improved understanding related to the five subject areas. The null hypothesis, there is no significant

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difference between pre-test means and post-test means of the total institute group, was tested by use of a t test. Results, as shown in Table 1, indicate that the null was rejected in all five cases. The conclusions were that members of the institute did improve significantly as a result of the institute in regards to achievement in the five areas of Business Organizations, Accounting, COBOL, Systems and FORTRAN.

Table 1
t TEST OF DIFFERENCE BETWEEN PRE-TEST POST-TEST MEANS

Subject Area	Pretest Mean	Post-test Mean	t	Probability
Business Organizations	9.68	17.18	7.21	p < .01
Accounting	16.64	23.64	7.69	p < .01
Cobol	21.32	43.95	11.61	p < .01
Systems	7.27	11.27	7.84	p < .01
Fortran	32.32	65.64	8.39	p < .01

The next questions seemed to be: is there any difference in aptitude or intelligence which would be useful in selecting future students for this type institute training? Is "Math" versus some "Other" background useful in terms of achieving in the five subject areas?

Tests were run to see if there was a difference between "Math" and "Other" on the scores of Numeric, Verbal, and Abstract Reasoning. The results, shown in Table II, indicate that the "Math" students were significantly superior on all three tests.

Table II
t TEST OF DIFFERENCE BETWEEN GROUPS ON APTITUDE TESTS

Aptitude	"Math" Mean	"Other" Mean	t	Probability
Numeric	36.38	28.89	3.47	p < .01
Verbal	39.31	31.0	2.60	p < .05
Abstract Reasoning	43.31	36.0	3.40	p < .01

The final question tested was: did the math group achieve better than the other group?

Therefore, an analysis of covariance, using the achievement pre-test score as the covariable was made. This analysis, in effect, adjusts the post-test means on the basis of difference between the groups on pre-test means. It answers the question: if the groups had an equal starting

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point (same pre-test means) is one group significantly better than the
other on post-test means? The result of that analysis is given in Table
III. The results indicate significant differences only on COBOL and ·
FORTRAN. It is interesting to note that the other group did significantly
less well on the Languages, COBOL and FORTRAN, while holding their own
in Accounting and Systems, and were slightly, but not significantly
better, on Business Organizations. It is also interesting to note that
those with the Math background scored higher on all pre-tests, but did
considerably higher on the Languages test. It seems evident that the
first year institute was much more profitable for the Math people so far
as languages were concerned.

Table III

COMPARISON OF MATH AND OTHER GROUPS IN ACHIEVEMENT WHEN PRE-TEST SCORES
ARE COVARIABLES IN AN ANALYSIS OF COVARIANCE TEST BETWEEN GROUPS

Test	Group	Pretest Mean	Post-test Mean	Adjusted Mean	F	Probability
Business Organization	Math	9.92	16.38	16.32	2.50	$.25 > p > .10$
	Other	9.33	18.33	18.43		
Accounting	Math	16.69	23.77	23.76		
	Other	16.55	23.44	23.45	.026	$p > .75$
Cobol	Math	24.77	45.15	44.89		
	Other	16.33	42.22	42.61	5.36	$p < .05$*
Systems	Math	8.31	12.15	11.68		
	Other	5.78	10.0	10.69	1.53	$.25 > p > .10$
Fortran	Math	44.54	75.38	71.93		
	Other	12.22	51.56	56.55	4 59	$p < .05$*

*Significant

Participant Evaluation

   A questionnaire was mailed out to all the participants on May 1, 1968,
after they had taught the second year of the two year program. A copy of
this instrument and the tabulated response from the participants is contained
in Appendix III.

   The questions of major significance to this report are 51 through 60.
The answers to questions 49 and 50 point out the inability of some of the
participants to answer many of the following questions.

Question 51 asks how participants view the institute after having taught
the second year compared to their view at the end of the institute. Only

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two (2) participants were of an opinion that the institute should have been altered. Their views differ from each other in that one desired more accounting and management work. The other preferred to have more on systems design and development. It is interesting to note that they reported two differing backgrounds; one with accounting, the other with a mathematics background. The individual which desired more accounting and management has not taught computer science courses.

The areas in which the participants (teachers) believe their student graduates to be most capable and appear frequently in the responses are programming using several languages, accounting, machine languages and computer operation. The areas in which the graduates seemed least capable were mathematics, scientific programming, systems development and design.

The response which is most frequent in ways to improve the institute was more instruction on systems. However, most of the respondents recognize the time element as a factor in this type of institute and that to give more emphasis in this area would by necessity take time from some other phase of study.

Question 55 asks for the participants over-all evaluation of the success of the institute. Fifteen of the respondents considered the institute highly successful for preparing teachers for the Oklahoma State-Wide Data Processing System. Only two (2) individuals suggested a change in this response.

The opinion of most of the participants as to the ability of their graduates to do computer programming for business and industry was that the students would have an excellent opportunity for success in business. At the time this instrument was administered none of the institutions had produced a graduating class; however, several students had been working part-time. One might refer back to the section on student placement to see what has actually happened to the graduates of the first seven schools to become part of the Oklahoma State-Wide Data Processing System.

The factors and qualities which interested most participants in becoming a data processing teacher were challenges, magnitude and opportunities of the computer field, interest in mathematics, accounting and business, enjoy problem solving and logical reasoning, previous experience in data processing and desire to teach.

Question 58 ascertains what the participants believe to be the aptitudes, interest and qualities which an individual should possess if he is considering becoming a data processing teacher. There were basically four responses: a good math background and enjoyment of problem solving; logical reasoning ability; business and accounting background; ability to teach and get along with people.

Various responses were received as aptitude factors which are most likely not to be ones for a data processing teacher. They include inability to communicate; one who likes manipulative work; one who likes to work alone; lack of consideration and understanding for others; poor mathematics and/or accounting background.

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The last question in this instrument was left open ended to give the respondents an opportunity to express themselves about anything they desire concerning the institute. Two participants suggested advanced training in the form of seminars or additional institute on new methods, procedures and developments in the field of data processing would be of benefit. Another response indicated a need for grouping participants more as to their abilities and background.

Student Placement

To evaluate the success of the institute one might look at what happened to the graduates of the two-year data processing program.

The Oklahoma State-Wide Data Processing System was made operational in September, 1966. Seven institutions became a part of this educational system during this time. The first graduating classes from these seven institutions produced seventy-six (76) graduates. As is the case in many of the technical education programs in Oklahoma, many students do not complete the prescribed program required for graduation in data processing but terminate training, some temporarily, to enter the labor market. Most of this group developed marketable skills while in the training program but are not accounted for in this report.

Twenty-four (24) graduates elected to continue their education at different institutions within the state. Of this group, seventeen (17) planned to work part-time or full-time as programmers while they were continuing in school. Twenty-two (22) of this group planned to major in the fields of business, accounting or mathematics.

Twenty-nine (29) graduates were placed in industries in the area of computer programmers. The starting salaries of these graduates range from $350.00 per month to $725.00 per month.

As of May 25, 1968, when this survey was conducted, ten (10) of the graduates were available for employment but were undecided as to where they would choose to work. Five (5) of the graduates were not available for employment. These five (5) were women or young ladies who were at different stages of family planning and/or development.

Eight (8) of the graduates planned to enter military service.

CONCLUSIONS

The institute was successful in meeting the stated objectives.

Teachers from other disciplines were trained to teach in the field of data processing.

Follow-up studies show that it is possible to train competent data processing and computer programming instructors in two summer institutes.

The pre-test and post-test scores all indicate a significant amount of improvement in the subject matter areas in which instruction was given.

A reasonable amount of success in predicting an individual's ability to profit from data processing instruction can be obtained by evaluating his numerical, verbal and abstract reasoning ability.

Test results indicate that participants with a mathematics background were more successful than those with other backgrounds; however, the difference is not great enough to establish a mathematics background as the determining factor in selecting potential data processing teachers.

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RECOMMENDATIONS

Follow-up instruction should be given to teachers periodically to up-grade in areas of individual weaknesses and present innovations in the field of data processing.

Training programs consisting of two summer institutes should be initiated to train data processing teachers as needed to meet the market demands.

APPENDIX I

APPENDIX 1

Curriculum and Schedule for Summer Institute 1957

COURSE	TIME	DATE
Compiler Languages and System Design	8:30 a.m. to 9:30 a.m. daily Monday thru Friday	June 6th to July 27th
Supervised Lab	9:30 a.m. to 10:30 a.m. daily Monday thru Friday	June 6th to July 27th
Cost Studies	10:30 a.m. to 11:30 a.m. daily Monday thru Friday	June 6th to June 30th
Business Organizations	10:30 a.m. to 11:30 a.m. daily Monday thru Friday	July 3rd to July 27th
Supervised Lab	11:30 a.m. to 12:30 p.m daily Monday thru Friday	June 6th to July 27th
LUNCH	12:30 p.m. to 1:30 p.m.	
Advanced Programming	1:30 p.m. to 2:30 p.m. daily Monday thru Friday	June 6th to July 27th
Operating Systems	2:30 p.m. to 3:30 p.m. daily Monday thru Friday	June 6th to July 27th
Supervised Lab	3:30 p.m. to 5:30 p.m. daily Monday thru Friday	June 6th to July 27th

I. Compiler Language and Systems Analysis and Design.

Systems Analysis, A Computer Approach to Design Models
Claude McMillan, Richard Gonzalez
Richard D. Irwin Publishers

A Guide to Fortran Programming
McCracken
Wiley Publishers

A Guide to Cobol Programming
McCracken
Wiley Publishers

**RCA Spectra 70 Cobol and Fortran Manuals were used as
supplementary texts.

II. Advanced Programming

RCA Spectra Assembly Language Manual

III. Operating Systems

On-Line Computer Systems
Edited by Eric Burgess
American Data Processing, Inc.

Business Information Processing Systems
Orville Elliot, Robert Wasley
Richard D. Irwin Publishers

IV. Business Organization

Business Administration, A Introduction Management Approach
Arthur M. Weimer
Richard E. Irwin Publishers

V. Cost Studies.

Principles of Cost Accounting-4th ed.
Chace, Schmiedicke, & Sherwood
Southwestern Publishing

APPENDIX II

)

Raw Scores of the Participants in Numerical, Verbal and
Abstract Reasoning and Pretest and Post-Test Score in
the Five Subject Matter Area Covered in the Institute

MATH Numeric	Verbal	Abstract	Business org. Pre	Post	Accounting Pre	Post	Cobol Pre	Post	Systems Pre	Post	Fortran Pre	Post
39	43	41	13	19	23	23	13	45	11	12	32	79
37	47	46	13	17	19	22	34	43	9	13	22	77
34	45	36	12	12	11	15	20	46	13	16	14	53
34	44	48	11	17	16	25	24	47	4	12	10	71
36	29	49	7	15	16	25	29	47	7	13	67	79
38	47	49	13	16	18	27	35	47	11	13	72	81
40	34	38	7	9	18	28	20	46	4	9	15	72
34	35	43	10	16	27	31	16	43	9	12	46	81
33	38	40	6	16	14	16	24	45	6	8	45	76
39	45	44	13	19	15	27	28	44	10	13	53	81
36	28	46	10	16	17	20	28	46	8	12	53	79
39	44	42	7	19	9	23	22	42	6	12	78	79
34	32	41	7	22	14	27	29	46	10	13	72	72
ACCOUNTING												
23	34	30	13	21	21	26	30	46	9	11	17	41
29	23	37	10	15	11	21	7	42	2	11	20	44
34	35	44	3	16	20	23	35	40	11	13	29	63
24	37	33	14	19	13	22	25	44	11	12	8	66
35	31	31	14	22	27	28	0	41	0	6	0	43
OTHER												
23	34	38	12	16	15	20	13	38	4	7	2	44
34	24	35	4	19	17	26	18	45	2	10	14	76
20	17	30	11	22	14	28	0	40	6	7	0	16
38	44	46	3	15	11	17	19	44	7	13	20	71

APPENDIX III

Teacher Evaluation
at
End of Teaching the Two-Year Curriculum
in
Relationship to Having Completed

"Summer Institute to Train Data Processing
Teachers for the New Oklahoma State-Wide Computer
Science System--Phase I and Phase II"

Institute Participant
Identification Number _____

Instructions: You answered all questions 1 through 48 at the end
of the second summer institute. Please answer these same questions
from how you now view them after having taught this past year.

49. Indicate level you have taught in the computer science program.

   1st year _____   2nd year_____   Both _____

   If taught in both levels, please list those computer science
   courses which you taught in both levels:

   _____

   _____

   _____

   _____

50. I completed the following: 1st Summer Institute _____
                                   2nd Summer Institute _____

51. Briefly explain below how you now view differently the training
    you received compared to how you viewed it at the close of the
    summer institute: (use back of sheet if necessary)

52. Briefly describe those areas in which you feel that your student
    graduates in general are most capable:

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53. Briefly describe those areas in which you feel that your student graduates in general are least capable:

54. Briefly describe how you think the summer institute could have been improved in order to have helped you to do a better job in overcoming the weaknesses of your graduates:

55. Briefly give your reactions as to the over-all success of the summer training institutes in preparing you to teach in the Oklahoma State-Wide Computer Science System:

56. Briefly give your opinion as to your graduates over-all ability to do computer programing for business, industry, etc.

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57. What aptitude factors and qualities interested you in becoming a data processing teacher?

58. List those aptitude interests and qualities which you think an individual should possess if he is considering becoming a data processing teacher.

59. List those aptitude factors which are most likely not to be assets for data processing teachers.

60. Other comments (regarding above questions and/or anything you wish to express).

49. INDICATE LEVEL YOU HAVE TAUGHT IN THE COMPUTER SCIENCE
    PROGRAM.

    01 1st Year
    02 Both
    03 Both
    04 Both
    05 Both
    06 Both
    07 Both
    08 1st Year
    09 None
    11 Both
    12 Both
    13 1st Year
    14 Both
    17 Both
    21 Both
    22 No Response
    23 Both
    24 Both
    25 Both
    26 Both

    IF TAUGHT IN BOTH LEVELS, PLEASE LIST THOSE COMPUTER SCIENCE
    COURSES WHICH YOU TAUGHT IN BOTH LEVELS:

    01 One
    02 Introduction to Data Processing
        Computer Programming
    03 Programming I (RCA 301 Machine Language)
        Programming II (RCA 301 Assembly Language)
        Programming III (FORTRAN)
        Programming IV (COBOL)
    04 Introduction to Data Processing
        Principles of Unit Record Equipment
        Programming I (301)
        Programming II (COBOL)
        Systems Design & Development
        Advanced Programming Problems
    05 Unit Record
        301 Programming
        FORTRAN Programming
        Introduction to Data Processing
    06 No computer science courses - I taught basic and cost
        accounting, accounting systems, business communications,
        business organizations and tech writing.

23

07 Introduction
    Machine Language 301
    Assembly 301
    FORTRAN, COBOL
08 Unit Record
09 No Response
11 Introduction to Computer Programming (Machine Language)
    Computer Programming (Assembly Language)
    Computer Programming (FORTRAN), Data Processing Application
    Data Processing Field Project
12 Introduction to Machine Processing
    Programming Languages I (FORTRAN)
    Programming Languages II (COBOL)
    Programming Languages III (ALGOL & RPG)
    Analog computation (Hybred & straight Analog)
    Program Projections (students part in industrial problems)
    Programming Languages IV (PL1 and other languages)
13 No Response
14 Programming Systems
    Systems Design & Development
    Accounting
    EAM
    Computer Programming I
17 Accounting (1st Year & Cost)
    Unit Record Equipment
    Programming (Machine & Assembly)
    COBOL
21 Introduction Course, Machine Languages, Assembly
    Language,
    COBOL
    Key Punch, RPG
22 No Response
23 Basic Computing
    FORTRAN
    COBOL
24 Computer Math I and II
    Statistics
    Introduction
    Programming II
    FORTRAN
    Programming Application & Programming Systems
25 Computer Science 113 (FORTRAN)
    Systems Development & Design
    Field Projects
26 COBOL Programming - 2nd year students
    Unit Record Equipment (accounting machines)

24

50. I COMPLETED THE FOLLOWING: 1st Summer Institute __
                                   2nd Summer Institute __

    01 Both
    02 Both
    03 Both
    04 Both
    05 Both
    06 Both
    07 Both
    08 Both
    09 Both
    11 Both
    12 2nd
    13 Both
    14 2nd
    17 2nd
    21 Both
    22 No Response
    23 2nd
    24 Both
    25 2nd
    26 2nd

51. BRIEFLY EXPLAIN BELOW HOW YOU NOW VIEW DIFFERENTLY THE
    TRAINING YOU RECEIVED COMPARED TO HOW YOU VIEWED IT AT
    THE CLOSE OF THE SUMMER INSTITUTE:

    01 Used specific equipment as State obtained for schools.
    02 I still view the first summer institute with contempt.
        However, during the second institute I was allowed some
        freedom of choice of content of courses and much good
        aid was available.
    03 At the end of the two years application of knowledge
        gained in the institute, I feel that the second institute
        was highly applicable to the work in the field. The
        first year was largely devoted to orientation and was
        effective in that area but somewhat lacking in giving
        specifics that inexperienced teachers need in order to
        perform effectively in the classroom.
    04 I think the training received was very beneficial for
        use in the classroom.
    05 No difference.
    06 I don't remember how I viewed it at the end of the summer.
        I do remember feeling (and I still feel this way) that I
        could have used the time to better advantage by taking more
        accounting courses. Now, I would change that slightly to
        include courses in management.

07 View not changed. Training was adequate and sufficient for time devoted to training.

08 At the close of the 2nd institute I felt that it was two summers well worth the effort and I still feel this way. The curriculum offered was excellent as was the additional information and help. Instruction and facilities were good.

09 About the same. I still think they tried to cover too much.

11 I could not have taught without it.

12 No different view.

13 I think it was very poor in procedure orientation such as analysis and documentation.

14 I feel the training should be broadened and less time should be spent on specific languages, with more time being spent on systems design and development and similar general courses. Also, there should be more generation languages.

17 Have not changed my view. I did gain a great deal from the last institute.

21 The last summer institute was real fine. We had realistic objectives and good teaching.

22 No Response

23 My views are about the same.

24 No particularly different view.

25 My view is no different. I believe the training was successful.

52. BRIEFLY DESCRIBE THOSE AREAS IN WHICH YOU FEEL THAT YOUR STUDENT GRADUATES IN GENERAL ARE MOST CAPABLE:

01 NA

02 Programming
Console Operators
Accounting

03 Computer Programming
Accounting

04 Operation (computer)
Programming

05 Programming
Assembly
COBOL
FORTRAN
Accounting
Math
Communications

06 It's too early to tell-they haven't been employed yet. However, I would guess that their strong areas (at least with the second year students) would be the programming languages for the 301 and COBOL.

26

07 Assembly Languages
    COBOL
    Accounting I
08 Machine Operation, machine panel wiring, general basic
    principles of data processing, being able to take a
    data processing problem from the beginning and plan it,
    implement it, and complete it.
09 NA
11 Machine Language
    FORTRAN
12 Computer System Supervisors
    Systems analyst with a strong background in ANALOG
    computers and instrument techniques. Also a good work-
    ing knowledge of information retrival.
13 Languages and documentation.
14 Stronger in programming 2nd generation machine and
    assembly language.
17 Programming
21 We require both math & accounting plus other requirements
    to obtain Associate of Science Degree; therefore, they
    obtain a well rounded background. They know programming
    well - COBOL, FORTRAN, Assembly, RPG, etc.
22 No Response
23 Our students are generally most capable as business
    programmers.
24 In the knowledge and use of the programming languages
    (machine, assembly, FORTRAN)
25 Coding techniques (COBOL, FORTRAN, Machine Language)
26 I don't feel qualified to make a statement since I
    did not observe all their work.

53. BRIEFLY DESCRIBE THOSE AREAS IN WHICH YOU FEEL THAT YOUR
     STUDENT GRADUATES IN GENERAL ARE LEAST CAPABLE:

01 NA
02 No Response
03 Mathematics (weak background at entrance in general)
    Use of tape and disk in data processing
04 Systems Development & Design (one must have some experience)
05 Scientific Programming
06 Again, I think it's too early to tell but my guess would
    be in accounting and systems, also, possibly technical
    writing. Systems would be the weakest because of my
    inability to locate an adequate text and also my own
    inexperience in this area.
07 Generally not adequate math backgrounds.
08 I'm teaching unit record equipment.

09 NA
11 Analysis, systems
12 Business Data Processing-we stress nothing but the basic concepts-debit and credit, profit and loss statement, simple cost accounting.
13 Related subjects
14 3rd generation languages. Also, the backup courses in accounting and mathematics are too few.
17 Accounting principles.
21 Systems, tapes, disc. I think we are rapidly adjusting this dilemma.
22 No Response
23 Our students are least capable as systems analysts because this occupation requires experience which is difficult to gain in college.
24 Systems
25 If any, FORTRAN IV.
26 I do not feel qualified to answer this statement.

54. BRIEFLY DESCRIBE HOW YOU THINK THE SUMMER INSTITUTE COULD HAVE BEEN IMPROVED IN ORDER TO HAVE HELPED YOU TO DO A BETTER JOB IN OVERCOMING THE WEAKNESSES OF YOUR GRADUATES:

01 More on systems
   More on equipment used in industry
02 No Response
03 Stress mechanics of tape and disk operations.
04 None except design or provide an aptitude test for new students.
05 More time could have been spent in interpreting the diagnostics, maps, edit information, etc., that is produced by the compiler during execution.
06 From my knowledge of my own weaknesses (see above) I would have benefited most by having more instruction on systems.
07 None
08 None
09 NA
11 More hands-on experience.
12 The summer institute was exceptional and could see no definite change. One improvement would seem best though; that would be more operating time on the computer along with course work.
13 Make students document and analyze.
14 Refer back to question 51.
17 Institute was satisfactory-any weakness is of my personal weakness.

28

21 We can only expect much from an institute when the recipients have such a varied background in formal education and experience. The comments listed in question 53 were not covered in the institute. Simple reason, not enough time!

22 No Response

23 I do not know of an improvement that would affect the weaknesses of your graduates.

24 I would have liked to study more about designing a complete application. For example, visit a system analyst on the job and see exactly what his work involves. (flow charts, etc)

25 I do not feel the institute could have.

26 When you are teaching new principles, it is necessary to teach all the basic fundamentals. I believe I could have done a better job in COBOL had the instruction been on a lower level.

55. BRIEFLY GIVE YOUR REACTIONS AS TO THE OVER-ALL SUCCESS OF THE SUMMER TRAINING INSTITUTES IN PREPARING YOU TO TEACH IN THE OKLAHOMA STATE-WIDE COMPUTER SCIENCE SYSTEM.

01 More on systems
   More on equipment used in industry.

02 No Response

03 Very effective transformation of teachers whose expertise existed in the area of Business or Mathematics to effective teachers in data processing.

04 Very successful.

05 I feel they were successful.

06 The institutes were quite adequate as a good background for introduction to various phases of data processing in general and COBOL and FORTRAN in particular. My own background was just not adequate to support me in this area.

07 Very good except initial effort at M.A.P.

08 Over-all I think the summer institutes were most helpful in preparing people to teach. Information presented was good and provided ways and means of procuring more additional aids.

09 Tried to cover too much at one time. Should have spent more time on basics such as machine language, assembly, etc.

11 Very successful. Could have not done without it.

12 Fine

13 Good

14 For the content of the courses presently being taught in this system, the training was adequate.

17 First institute too fast and not enough basic under-
   standing. Second institute was all right. Could have
   worked a little harder.
22 No Response
23 The institute gave me confidence that I had the knowledge
   to teach data processing.
25 The institute was successful as far as training I received
   on the 301.
26 My background was so limited that I do not believe I could
   make a statement that would be applicable to how successful
   this institute was last summer.

56. BRIEFLY GIVE YOUR OPINION AS TO YOUR GRADUATES OVER-ALL ABILITY
    TO DO COMPUTER PROGRAMMING FOR BUSINESS, INDUSTRY, ETC.

    01 NA
    02 This varies with each group.
    03 The top 50% are better prepared than the average person
       in the industry at the end of one years experience.
    04 Average (over-all)
    05 I feel that our graduates are capable of the work required
       by business and industry for beginning programmers and
       have the necessary base for advancement in the field.
    06 Only time will tell but several of them have been given
       good offers and prospective employers seem very interested
       in the type of program we are offering and seem to think
       it is more than adequate for beginning positions in data
       processing as operators and/or programmer-trainees.
    07 Present indications are that they are succeeding.
    08 Unit record equipment over all ability - good.
    09 NA
    11 I have no basis to form an opinion as of now.
    12 We have had students working on a part-time basic
       instructional plan. Several first year students have
       summer jobs (5) with employers that were on part-time
       instructional plan. One second year student (graduates
       at end of summer term) has a part-time job in industry
       as a programmer. All graduating students have had at
       least 3 offers each.
    13 Limited - all high school students in one year program-
       about 25-50% could hold jobs.
    14 Good, The average graduate should be able to successfully
       do programming for business applications with very little
       additional training.
    17 They will have a weakness in that as an instructor I do
       not know what business will require of the students. I
       need more problems as found in a business activity.

30

21 The people with good grades (3.0) average have good
   overall ability. I feel they are very competent
   graduates. Graduates that fall much below that,
   we have our reservations. Now, we can't screen our
   people as much as we deem necessary for reasons in-
   volved with the administration.
22 No Response
23 Most of our graduates, after a few months of experience,
   could be good to excellent programmers.
24 Those who finished the complete 2 year course with
   average grades or better have excellent abilities to
   do computer programming.
25 I feel our graduates, or rather most of our graduates,
   would and will be very successful. Some have had good
   offers in industry.
26 In my observances of my COBOL class, I believe the
   students I had will have enough basic theory to make
   application in business.

57. WHAT APTITUDE FACTORS AND QUALITIES INTERESTED YOU IN BECOMING
    A DATA PROCESSING TEACHER?

01 New teaching advantages and advancement.
02 No Response
03 No Response
04 Listed below
05 The challenge, magnitude, and opportunities of the computer
   age.
06 None-the director of the area school did that.
07 Math and desire to learn.
08 Challenge-interesting and changing field.
09 Interest in math and business.
11 No factors or qualities, but a person. (Dr. Andree of O.U.)
12 I felt that with my many years of past experience with
   computers that I could better help the younger people in
   a very rewarding career.
13 No Response
14 Background in accounting.
17 I needed a change in my teaching assignment.
21 Fascination, challenge, opportunity.
22 No Response
23 My education was in technical areas and I completed
   programming courses in college.
24 Enjoy problem solving and logical reasoning. Frankly,
   I didn't know much about the field before starting the
   institutes.
25 I have always wanted to be a teacher. I had worked in
   data processing, and when an opening became available, I
   accepted it.

26 My knowledge of accounting and how data processing
    can be applied to accounting.

58. LIST THOSE APTITUDE INTERESTS AND QUALITIES WHICH YOU
     THINK AN INDIVIDUAL SHOULD POSSESS IF HE IS CONSIDERING
     BECOMING A DATA PROCESSING TEACHER.

01 Logic reasoning, math and business.
02 No Response
03 No Response
04 Like to work with problems. Have an interest in
    math, business, and people.
05 Must enjoy working with the students in class and
    out. Must enjoy solving detailed problems.
06 High math aptitude, especially logic. High abstract
    reasoning. An interest in management and communications
    needs and requirements.
07 Drive and desire to learn and teach. Should have
    successful teaching experience.
08 Ability to think logically and be able to reason,
    particularly from abstract point of view. Perseverance
    and patience - ability to stay with something till
    it is finished.
09 Math and business background and interest.
11 Willing to put in overtime, detail work, aptitude for
    math reasoning.
12 Patient, self control in the complicated and often
    tedious job is absolutely necessary. Above average
    in insight and logic.
13 No Response
14 Should preferably have a strong background in accounting
    or math.
17 Must be willing to work hard, put in long hours, be in
    3 or 4 different places at the same time.
21 Just to become a teacher, a large list could be compiled
    other than that, one should feel as listed on question
    57, become more willing to up-date his formal education
    as technology advances, have a science background, be
    willing to work.
22 No Response
23 Knowledge of data processing and educational processes.
    Ability to think logically.
24 Good personality-interest in people, good abstract
    reasoning ability-thinks logically, on-the-job experience,
    math background, able to communicate.
25 Must have a working knowledge of what data processing is,
    what it can do and is doing for industry. Must be willing
    to learn everyday.

32

26 Mathematical background. Logic (good reasoning
   ability), basic business background, good under-
   standing of students, interest in changing methods
   to keep up with what business and industry wants.

59. LIST THOSE APTITUDE FACTORS WHICH ARE MOST LIKELY NOT
    TO BE ASSETS FOR DATA PROCESSING TEACHERS.

    01 English, music, and home economics majors.
    02 No Response
    03 No Response
    04 Inability to communicate
    05 Likes to work alone. Likes manipulative work.
    06 No Response
    07 Lack of consideration and understanding.
    08 Person who does not pay close attention to details,
       who does not like problem solving, and an individual
       who does not like to work with machines.
    09 Social studies, some science fields.
    11 Not willing to stick to a problem until it is finished.
    12 Small child aptitude could be considered an asset
       though not necessarily a sufficient asset for a data
       processing teacher. However, I would like to comment that
       a person whose background and experience in data processing
       that has been solely in the unit record area has no
       particular advantage over someone who has no experience
       at all in the field.
    17 Try to learn this field without doing any work.
    21 No patience, no interest, no background and not willing
       to correct it, not professionally oriented particularly
       on junior college level.
    22 No Response
    23 No Response
    24 Inexperience-lack of actual industrial exposure.
    25 I cannot say
    26 Poor mathematical background and reasoning power.

60. OTHER COMMENTS (REGARDING ABOVE QUESTIONS AND/OR ANYTHING
    YOU WISH TO EXPRESS).

    01 No Response
    02 No Response
    03 No Response
    04 No Response
    05 No Response
    06 No Response
    07 No Response
    08 No Response

09 No Response
11 No Response
12 No Response
13 No Response
14 An occasional seminar for the teachers in the system
to bring them up-to-date on new methods, procedures,
courses, development, etc., would be extremely valuable.
17 No Response
21 No Response
22 No Response
23 No Response
24 Training has been adequate to date. However, I feel
there should be arrangements for continued education.
For example, offering an advanced degree or further
institutes.
25 I was teaching data processing before I attended the
institute.
26 I believe the summer institutes could be very valuable
if the participants were placed at different levels of
learning, instead of all participants being in the same
group.

34