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COUNSELOR TRAINING IN STATISTICAL ANALYSIS VIA ELECTRONIC PROCESSING FOR RESEARCH ON LOCAL AND REGIONAL STUDENT DATA. FINAL REPORT.

Altoona Area School District, Pa.
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In this institute, the participants were trained to use peripheral computer related equipment. They were taught Fortran programming skills so they might write and redimension statistical formulary programs, and they were trained to assemble data so they might access computers via both card and punched-tape input. The objectives of the Institute were to train counselors to better collect, assemble, analyze, and report school and student related data to those consumers of such data in our society by: (1) teaching hollerith data processing card characteristics; (2) teaching trainees how to use the key-punch, sorter, collator, alphabetic interpreter, and card reproducer; (3) teaching Fortran programming techniques; (4) reviewing the statistical concepts of central tendency, correlation, standard deviation, chi-square, and t-tests of significance and relating these procedures to electronic analysis of available student data; (5) teaching trainees to operate teletype remote terminals; and (6) offering a supervised practicum in statistical program writing and the use of data processing and computer accessing equipment. The training also attempted to encourage counselors to engage in cooperative research and analysis endeavors with other schools in the area, thereby gaining insight into school and student characteristics on a regional basis. (Author)

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October 1967

U.S. DEPARTMENT OF
HEALTH, EDUCATION, AND WELFARE

Office of Education
Bureau of Research

Counselor Training in Statistical Analysis Via Electronic Processing For Research on Local and Regional Student Data

Project No. 7-8239
Grant No. -1-7-078239-2919

Thomas E. Long

October 1967

The research reported herein was performed pursuant to a grant with the Office of Education, U. S. Department of Health, Education, and Welfare. Contractors undertaking such projects under Government sponsorship are encouraged to express freely their professional judgement in the conduct of the project. Points of view or opinions stated do not, therefore, necessarily represent official Office of Education position or policy.

Altoona Area School District

Altoona, Pennsylvania 16603

Introduction. This research Institute trained twenty-five selected school counselors in statistical analysis procedures using electronic computer processing so they might more rapidly and accurately analyze the masses of student data available to them.

In the two week Institute, August 14 to August 25, 1967, the participants were trained to use peripheral computer-related equipment; they were taught Fortran programming skills so they might write and redimension statistical formulary programs, and they were trained to assemble data so they might access computers via both card and punched-tape input. The training in punched-tape input involved the use of remote terminal equipment which is available to most school systems today.

The objectives of the Institute were to train counselors to better collect, assemble, analyze, and report school and student related data to those consumers of such data in our society by:

1. Teaching hollerith data processing card characteristics.

2. Teaching trainees how to use the key-punch, sorter, collator, alphabetic interpreter, and card reproducer.

3. Teaching Fortran programming techniques.

4. Reviewing the statistical concepts of central tendency, correlation, standard deviation, chi-square, and t-tests of significance and relating these procedures to electronic analysis of available student data.

5. Teaching trainees to operate teletype remote terminals.

6. Offering a supervised practicum in statistical program writing, and the use of data processing, and computer accessing equipment.

The training also attempted to encourage counselors to engage in cooperative research and analysis endeavors with other schools in the area, thereby gaining insight into school and student characteristics on a regional basis.

Description of the program. The Institute instructional program embraced the following major content areas. Fortran programming, the use and capabilities of computer-related peripheral equipment, the use of remote terminal computer accessing equipment with punched tape input, a review of the statistical concepts of central tendency, correlation, standard deviation, chi-square, and t-tests of significance, and a supervised practicum in program writing, and the use of data processing equipment.

Two consultants also made presentations related to the topics of the counselor's role as a researcher and data analyst and the types of data needing analysis in today's schools.

Developmentally, the Institute was initiated by introductions and an orientation to the training objectives. This was immediately followed by the first consultant's speech relative to the counselor serving as a researcher and data analyst. As expected, this presentation helped conceptually crystallize the training objectives. Following this introduction the first week was devoted to instruction and practice in program writing and the use of data processing equipment.

The second week included the consultant's presentation relative to the types of data needing analysis in schools. This presentation was complimented by discussions of statistical concepts and the development and use of statistical programs in sample problems. It was here in the training experience that the participants began to obtain hands on experience in accessing the computer via the remote terminals.

The final activity of the training experience was the evaluation of the Institute by the participants.

Evaluation of the Program.

1. (a.) Content - Relative to the content of the training experience, it seems that more time might have been devoted to hands-on experience in using all available equipment, expecially the key-punch and remote terminals. Student evaluation strongly supported extension of this kind of training by at least one week.

It also seems that it would have been profitable to include a field trip to a large university computer center where the participants could have observed the multiplicity of research applications of the computer.

(b.) Staff - The participant-staff ratio was excellent, 13 to 1 in both data processing and programming sessions, and 25 to 1 in statistical presentations. It seems, however, that it would have been advisable to have only one programming instructor rather than two. Although this would have necessitated a schedule reorientation, it seems advantageous in that both groups would have received exactly the same programming instruction at the same time. This should have facilitated the total group practicum activities.

It would also seem profitable for the participants to bring in one nationally known researcher, on a consultative basis, to address the group.

(c.) Trainees - In the Institute proposal the training agency imposed its own severe acceptance criteria. These included: (1) the participants must have earned a master's degree in counseling, (2) they must be employed in Pennsylvania schools or in out-of-state schools within a 200 mile radius of Altoona, Pa., (3) they must have been full-time counselors, and (4) they must have been state certified counselors, with successful completion of at least one graduate course in statistics. The state or regional employment requirement was effected to keep the operating budget low.

Inquiries and application requests, however, came from many parts of the United States, and many were received from student personnel disciplines other than that of counseling.

It would seem advisable and interesting to plan two future institutes of this type, one for counselors only, and one for other school student personnel workers. Conduct them consecutively, utilizing the same instructional specifications and staff and then follow-up on the participants of both groups to determine who needs and used the computer research skills most frequently, realistically, and why.

(d.) Budget - The budget was more than adequate with the selection criteria used in the recently completed institute. It is suggested that a slightly larger budget be considered if the program described above seems meritorious. This would seem mandatory if the training would be extended by one week and if regional limitations were removed.

2. The major strengths of the Institute seem to have been (a.) the interest of the participants, which is personally interpreted as an indication of need of these types of skills in the counseling profession, (b.) the staff available, and (c.) the facilities of the Altoona Area School System - the computer facilities which were described in the proposal document were significantly upgraded before the Institute began. This computer system at present, if not the largest, is one of the largest in public education in the United States. A final, yet most significant, local strength which deserves notation here is the professional interest support, and encouragement to attempt such research endeavors afforded by the local superintendent of schools.

3. The major weakness of the program seems to have been the lack of time to broach and discuss related research topics. In informal contacts with the participants the concepts of research design and PERT were discussed and demonstrated. Most participants wanted presentations made on these topics. The parameters of the Institute and time limitations, however, excluded these activities.

It is personally felt that these obstacles could be overcome with slight program reorientation.

4. In over-all evaluation, the Institute seems to have been successful. The participants supported the activities verbally and on the evaluation instruments. During the next academic year the participants will be surveyed to determine if, how, and why they apply the skills learned.

5. The only recommendation which can be offered concerning USOE administration is that the Institute staff and participants would have welcomed a visit by some USOE research staff member during the training session. We feel we might have profited from on site evaluation.

Program Reports

1. Publicity - This Institute was originally publicized by the USOE. After the grant notification was received locally it was

publicized by local newspaper, radio and television services.

Information also appeared in the April 1967 issue of the Educational Researcher, the April 1967 Applachian Advance, a publication of the Applachia Educational Laboratory, and in the April 17 issue of the Pennsylvania State Education Association Reporter.

The writer also discussed this Institute with five different groups of SPICE (Special Programs for Improving Counselor Effectiveness) trainees at the Pennsylvania State University.

A brochure was developed and distributed at the Pennsylvania School Counselors Conference at Hershey, Pa., in April, 1967. It was also mailed, in April, to all school superintendents and diocesan superintendents in the state. It was mailed to all out-of-state requests and distributed to the SPICE groups at Penn State.

2. Application Summary

a. Approximate number of inquiries from prospective trainees (letter or conversation) 85

b. Number of completed applications received 45

c. Number of first rank applications (Applicants who are well-qualified whether or not they were offered admission) 39

d. How many applicants were offered admission 25

3. Trainee Summary

a. Number of trainees initially accepted in program 25
Number of trainees enrolled at the beginning of program 25
Number of trainees who completed program 25

b. Categorization of trainees

(1) Number of trainees who principally are elementary or secondary public school teachers (counselors) 25

(2) Number of trainees who are principally local public school administrators or supervisors None

(3) Number of trainees from colleges or universities, junior colleges, research bureaus, etc. (specify)

_____ None
_____
_____

Program Director's Attendance

a. What was the number of instructional days for the program? 10

b. What was the percent of days the director was present? 95%

5. Financial Summary--(Note: This summary does not serve as a final financial report so amounts need not be exact.)

		Budgeted	Expended or Committed
a.	Trainee Support		
	(1) Stipends	$3,750.00	$3,750.00
	(2) Dependency Allowance	1,875.00	1,680.00
	(3) Travel	800.00	453.44
b.	Direct Costs		
	(1) Personnel	1,816.00	1,816.00
	(2) Supplies	365.00	348.28
	(3) Equipment	None	None
	(4) Travel	None	None
	(5) Other - Postage & printing	130.00	114.57
	Keeping computer operating 80 hours	400.00	400.00
c.	Indirect Costs	731.00	684.96
	TOTAL	$9,867.00	$9,247.25

Participant Evaluation.

The following information reports on the nature of responses made by the participants on the Institute evaluation forms.

EVALUATION INSTRUMENTS

COUNSELOR RESEARCH TRAINING INSTITUTE
ALTOONA AREA SCHOOL DISTRICT
ALTOONA, PENNSYLVANIA 16603

Statement	Agree	Disagree
1. The purpose of the Institute was clear to me	(100%)	( )
2. The objectives of this Institute were not realistic	( )	(100%)
3. Specific purpose made it easy to work efficiently	(96%)	(4%)
4. The participants accepted the purpose of the Institute	(100%)	( )
5. The objectives of this program were not the same as my objectives	(8%)	(92%)
6. I didn't learn anything new	( )	(100%)
7. The material presented was valuable to me	(100%)	( )
8. I could have learned as much by reading a book	( )	(100%)
9. Possible solutions to my problems were considered	(96%)	( ) 1 person made no response
10. The information presented was too elementary	( )	(100%)
11. The instructors really knew their subject	(100%)	( )
12. I was stimulated to think objectively about the topics presented	(100%)	( )
13. New acquaintances were made which will help in future research	(100%)	( )
14. We worked together as a group	(92%)	(8%)
15. We did not relate theory to practice	(12%)	(88%)
16. The sessions followed a logical order	(100%)	( )

INSTITUTE EVALUATION FORM (con'd)

	Statement	Agree	Disagree
17.	The schedule was too fixed	(20%)	(80%)
18.	There was very little time for informal conversation	(20%)	(80%)
19.	I did not have the opportunity to express my ideas	(4%)	(96%)
20.	I really felt a part of this group	(100%)	( )
21.	My time was well spent	(100%)	( )
22.	The Institute met my expectations	(100%)	( )
23.	I received no guide for further action	( )	(100%)
24.	Too much time was devoted to trival matters	(4%)	(96%)
25.	The information presented was too advanced	(8%)	(92%)
26.	The content presented was not applicable to the work I do	( )	(100%)
27.	Institutes of this nature should be offered again in the future	(100%)	( )
28.	Institutes such as this will contribute little to educational research and development	(4%)	(96%)
29.	The consultants speeches were appropriate	(84%)	(16%)

Aug. 1967 Adapted from Evaluation form of Ohio State University

EVALUATION INSTRUMENT
COUNSELOR RESEARCH TRAINING INSTITUTE
ALTOONA AREA SCHOOL DISTRICT
ALTOONA, PENNSYLVANIA 16603

1. Of what value do you think this institute training has been for you as a counselor?
   Very Valuable 76% Valuable 24% Little Value _____ No Value _____

2. Do you expect that you will be more capable of analyzing student data after the training experience?
   Yes 100% No

3. Do you think that remote terminals would be valuable tools to have in the counseling areas of your school?
   Very Valuable 60% Valuable 40% Little Value _____ No Value _____

4. Would their availability in counseling offices increase the counselors data analyses and research capabilities?
   Greatly increase 76% Increase 24% Decrease _____ No Difference _____

5. Would their availability increase counselors motivations to do local research?
   Greatly Increase 56% Increase 44% Decrease _____ No Difference _____

6. In your estimation are counselors adequately trained in the MS program to do research?
   Yes 4% No 96%

7. In your estimation are most counselors after completing the MS program knowledgable in:

Research design	Yes	20%	No	80%
Statistics	Yes	68%	No	32%
Data Processing	Yes	16%	No	84%
PERT Processing	Yes	4%	No	96%
Research reporting	Yes	16%	No	84%

8. Do you feel that a functional knowledge in these areas is important for counselors in todays schools?
   Very Important 64% Important 36% Of Little Importance _____
   No Importance _____

9. How would you rate the information and review sheets that were distributed during the institute?
   Very Good 76% Good 24% Fair _____ Poor _____ Very Poor _____

10. Did you feel that the time available to you on the remote terminals was sufficient?
    Yes 24% No 76%

11. Were the demonstrations on the use and application of equipment satisfactory?
    Excellent 72% Good 28% Fair _____ Poor _____ Very Poor _____

INSTITUTE EVALUATION FORM (cont'd)

12. Were the demonstrations on the use of equipment appropriately presented in relation to the time when program writing and computer accessing activities were encountered?
Yes 88% No 12%

13. Do you feel that you received adequate personal instructional attention during the institute?
Yes 96% No 4%

14. Do you feel that the institute was of adequate duration?
Yes 24% No 76%

If No

It should be extended by 1 week 68% 2 weeks 16% More than 2 weeks 16%

It should be shortened 0%

EVALUATION INSTRUMENT
COUNSELOR RESEARCH TRAINING INSTITUTE
ALTOONA AREA SCHOOL DISTRICT
ALTOONA, PENNSYLVANIA 16603

We would like to have your frank evaluation of the Institute. Your reactions to the following items not only will provide data for evaluating the present sessions but will be of value in planning similar activities. It is not necessary for you to put your name on this evaluation instrument but, if you want to, we would appreciate your doing so.

Please respond to each item.

1. Did you live at the Altoona campus? Yes 68% No 32%

2. Were the accomodations satisfactory?

   Excellent 56% ; Very good 40% ; Fair 4% ; Poor ____

3. Please state the major advantages of living in the type of accomodations you had.

   Typical responses:

   Economical
   Clean
   Recreation area
   Private
   Fellowship of others

4. Please state the major disadvantages of living in the type of accomodations you had.

   Typical responses:

   None
   No cooking or refrigeration facilities
   No nearby eating places, however this is minor
   Too far to the center of town and the school

5. How do you rate the Institute with respect to the extent to which the following objectives have been realized by yourself?

   (A) Increase in knowledge of data processing procedures:

   Excellent 80% ; Good 16% ; Fair 4% ; Poor ____; Very Poor ____

   Comment: Typical Responses
   Get good over-all picture of EDP
   Can communicate now
   Great potential for guidance

   (B) Increase in ability to write a simple statistical program in Fortran:

   Excellent 56% ; Good 40% ; Fair 4% ; Poor ____; Very Poor ____

Comment: Typical Responses
I still need help
Practice in writing and running machines was helpful
Not enough background to fully comprehend Fortran
Now have confidence in using the computer

(C) Increase in knowledge of statistics and their application:

Excellent 52% ; Good 32% ; Fair 16% ; Poor _____; Very Poor _____

Comment: Typical Responses
Had six or seven statistics courses - yet appreciated a review
Knowledge was not new but computer use was
Could have used more time to discuss statistical problems
A good review of basic statistics
Needed more time to study in depth
I was fully knowledgeable in statistics before the institute

(D) Increase in knowledge of research projects and programs possible:

Excellent 20% ; Good 76% ; Fair 4% ; Poor _____; Very Poor _____

Comment: Typical Responses
Need more uses of the statistics listed
I intend to pursue further a study of research design
I never realized how little my school does in research - I intend to change this
This area would be excellent for another institute

(E) Opportunity for exchange of ideas with other participants:

Excellent 68% ; Good 28% ; Fair 4% ; Poor _____; Very Poor _____

Comment: Typical Responses
As much as anyone would want
Everyone was friendly and helpful
No lack of communication

6. To what extent, if any, did you experience the following difficulties:

(A) Lack of background knowledge in statistics:

Much _____; Some 24% ; Little 28% ; None 48%

(B) Lack of background knowledge in data processing:

Much 8% ; Some 48% ; Little 20% ; None 24%

(C) Lack of experience in research and investigation activities on the job in your school:

Much 28% ; Some 20% ; Little 32% ; None 20%

(D) Lack of background knowledge in computer programming:

Much 40% ; Some 28% ; Little 24% ; None 8%

7. How do you rate the quality of instructors?

(A) Relating to data processing

Excellent 76% ; Good 24% ; Fair _____ ; Poor _____ ; Very Poor _____

Please Comment: Typical Responses
Obviously knew what he was talking about
Fine program
Seemed very knowledgeable
Instructor rates high
Deeply interested and sincere
A born teacher
All instructors were excellent
Just tremendous

(B) Relating to Programming:

Excellent 80% ; Good 20% ; Fair _____ ; Poor _____ ; Very Poor _____

Please Comment: Typical Responses
Good teacher
Outstanding
Thorough - complete
Led us step by step down the path

(C) Relating to educational statistics:

Excellent 64% ; Good 32% ; Fair 4% ; Poor _____ ; Very Poor _____

Please Comment: Typical Responses
Brought back old skills and put new light on them
Excellent
Makes statistics come alive and shows how they can be used in a practical manner
A good topic for a follow-up program
Could have spent more time on practical exercises

8. Of what value were the speeches by outside consultants:

Great 8% ; Substantial 68% ; Slight 24% ; None _____

Please comment: Typical Responses
Well keyed to work of the institute
Very good selection
Quality information
Showed importance of the program now and in the future
Helped but were not vital
Would have rather had practice time although all speakers were good

9. How do you rate the administration of the Institute?

Excellent 84% ; Good 16% ; Fair _____; Poor _____; Very Poor _____

Please comment: Typical Responses
Attention to details was appreciated
Everything was well organized
Enthusiasm can be contagious, you people have it
Extremely fair, helpful and cooperative
Well organized - time well spent
Show excellent foresight
Time available used efficiently

10. How do you rate the following facilities for institute participants

Excellent, Good, Fair, Poor, Very Poor

(A) Data Processing
(B) Computer
(C) Classroom
(D) Lounges
(E) Area restaurants
(F) Instructional handouts

All items rated fair or above.
Classroom was described as noisy from traffic from city streets

11. How do you rate the over-all effectiveness of the Institute:

Excellent 84% ; Good 16% ; Fair _____; Poor _____; Very Poor _____

Please comment: Typical Responses
I can talk a good story now and even substantiate it to a degree
I know how to use trained personnel available in our school
Should prove invaluable in our work
Gained greater degree of understanding than I anticipated
Much practical, readily usable experience gained
I think this institute accomplished exactly what its objectives stated
Would be good to have a short program just for introduction of possibilities for administration

Comments: This was better than most of my graduate work
Definitely will help me with my program at my school

12. Did the Institute fail to provide some learning experience which you expected and wanted? Please explain what they were:

Typical Responses:
Not really - didn't know what I expected and am pleased with what I received
No
Everything expected plus more
More guides on the application of statistical data to our line of work
Yes - show other uses besides strictly statistical data
I can't think of any
One instructor was spread too thin for thirteen students
It covered more than I expected

13. What, if any, were notable strengths of the Institute?

Typical Responses:
Staff, equipment, preparation, congenial atmosphere. I felt like a V.I.P.
Organization, excellent teachers
Pace of presentation
Ease of accessability of equipment
The "handouts" are meaningful and purposeful
Time and permission to experiment with such expensive equipment
The absence of pressures - such as grades
Responsive group
Comprehensiveness of the program
Well planned
Professional manner
Provided meaningful and useful information
Completed its objectives
Perfect hours, good working areas
The complete cooperation of school officials in making me feel at home
The resources put to our use, it was a real laboratory situation

14. What were notable weaknesses of the Institute?

Typical Responses:
Time - length
Devote more time to research projects
Rather much information to cover
None
Need more key-punches
Fortran manual should be provided to each individual to keep
Spend more time on programming and less on data processing
Time
Should have been longer

EVALUATION INSTRUMENT (cont'd)

Please make suggestions for the improvement of this kind of Institute.

Typical suggestions:
Longer Institute
Smaller work groups
Have Institute earlier in the summer, I am a coach
Have books and manuals for each individual
PERT workshop
More individual projects
This would be an excellent program for principals and administrators
Have a follow-up program
Discussions on research designs
More time on programming - less on data processing

August 1967 - Adopted from the evaluation form of the
University of Wisconsin 1967

BUDGET

For accounting purposes, the following information is submitted:

		Budgeted	Expended
(A)	Trainee support - 25 trainees	$3,750.00	$3,750.00
(B)	Dependency allowance - 56 dependents	1,875.00	1,680.00
(C)	Travel costs	800.00	453.44
(D)	Personnel Expenses		
	Director	426.00	426.00
	2 programming instructors	740.00	740.00
	Data processing instructor	350.00	350.00
	Secretary	150.00	150.00
	Consultants	150.00	150.00
		1,816.00	1,816.00
(E)	Consumable Supplies Expenses		
	5 rolls practice teletype tape		5.00
	5 rolls teletype printer paper		6.00
	4 boxes computer printer paper		100.00
	2 boxes IBM cards		25.00
	5 rolls laminated teletype tape		150.00
		BUDGETED $290.00	286.00
(F)	Stationery Supplies Expenses		
	Plastic name badges		4.95
	Notatorial seals		.69
	Notebooks		40.14
	Mimeographing		8.96
	#10 Envelopes		.60
	4 reams #195 paper		2.60
	Rag bond paper		2.25
	Rubber bands		.69
	Paper clips		.20
	3 X 5 cards		.40
	5 X 8 cards		.80
		BUDGETED $75.00	62.28
(G)	Printing and Postage Expenses		
	Brochures		57.10
	Postage		25.95
	Certificates		20.00
	Silk screening (notebooks)		11.52
		BUDGETED $130.00	114.57

BUDGET (cont'd)

	Budgeted	Expended
(H) Other Direct Costs Expense of keeping computers and other related equipment operational for 80 hours	400.00	400.00
(I) Indirect Costs	731.00	684.96
(J) Budget Summary		
Trainee Support	3,750.00	3,750.00
Dependency Allowance	1,875.00	1,680.00
Travel Costs	800.00	453.44
Personnel Expenses	1,816.00	1,816.00
Consumable Supplies	290.00	286.00
Stationery Supplies	75.00	62.28
Printing and Postage	130.00	114.57
Other Direct Costs	400.00	400.00
Indirect Costs	731.00	684.96
TOTALS	$9,867.00	$9,247.25

Grant funds due Altoona Area School District $9,247.25

Counselor Research Training Institute

Sponsored by ALTOONA AREA SCHOOL DISTRICT in cooperation with USOE

OBJECTIVES

Today's counselors are custodians of large amounts of school and student data—data which must be organized, analyzed, studied, and reported. Fortunately, many schools are availing themselves of computer installations which can assist counselors and other educators in data analysis endeavors.

Many schools, and regions of the state, however, have no computer services available to them, yet schools and counselors would profit from studies of local and regional data. This Institute, therefore, is designed to help counselors—in schools with or without computers—to develop pertinent electronic research skills to analyze the masses of data available to them.

The participants in the Institute should have, on completion of the Institute experience, the following understandings and competencies:

1. An operational understanding of data processing equipment including the key punch, sorter, collator, reproducer and interpreter.

2. The ability to write a simple statistical computer program.

3. The operational ability to gain access to any available computer via a teletype remote terminal using a punched tape system.

4. A more complete understanding of the use and application of the concepts of central tendency, standard deviation, correlation, chi square, and t-tests of significance.

THE PROGRAM

The Institute will be conducted in the computer center of the Altoona Area School District. Each enrollee will gain hands-on experience in the use of the computer and all peripheral equipment.

Each participant will have in his possession at the end of the Institute a complete punched card and tape program for the statistical procedures listed above.

Particular emphasis will be devoted to the types of regional analysis endeavors in which counselors can engage in cooperation with other school districts.

Consultant presentations, appropriate to Institute concerns, will be made by counselor education personnel from The Pennsylvania State University.

The sessions will run Monday through Friday, 8:30 a.m. to 4:00 p.m., August 14 to 25, inclusive.

Each trainee will be expected to attend all morning and afternoon sessions. Opportunities for evening sessions will be available to those interested.

ELIGIBILITY REQUIREMENTS

The Institute will accommodate 25 participants selected from all applicants meeting the following stated requirements.

1. Applicants must be presently employed as full-time elementary or secondary school counselors.

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Each trainee will be expected to attend all morning and afternoon sessions. Opportunities for evening sessions will be available to those interested.

ELIGIBILITY REQUIREMENTS

The Institute will accommodate 25 participants selected from all applicants meeting the following stated requirements.

1. Applicants must be presently employed as full-time elementary or secondary school counselors.

2. Applicants must be employed in school districts in Pennsylvania or in out-of-state school districts within a radius of 200 miles of Altoona, Pennsylvania.

3. Applicants must have earned a Master's Degree in counseling and guidance.

4. Applicants must hold state certification as a guidance counselor in the state in which they are employed.

5. Applicants must have completed at least one graduate level course in statistics. (Evidence to this fact may be a college transcript or a letter from the applicant's major college advisor).

CREDIT

No graduate credit will be given for the Institute as the school district is not an institution of higher education. A certificate of training will be presented upon completion of the Institute.

STIPENDS

Each participant will be paid a stipend of $75.00 per week, plus $15.00 per week for each dependent throughout the Institute.

Travel reimbursement will be made at the rate of .08 per mile for one round trip between the participant's place of residence and Altoona, Pennsylvania. Participants will pay no Institute fees.

LIVING ACCOMMODATIONS

Participants will be housed in the residence halls of the Altoona Campus of The Pennsylvania State University at the following rates—

Single room $45.50

Double room $39.00 per person

Above rates are for the duration of the Institute. Meals will not be available at the Altoona campus.

APPLICATIONS

Applications from those meeting the eligibility requirements will be accepted immediately and must be postmarked no later than May 15, 1967. All applicants will be notified of the action taken on their application by letter postmarked before June 1, 1967.

For application blanks write to The Director of the Counselor Research Training Institute:

Thomas E. Long
Research & Guidance Services Dept.
Altoona Area School District
Altoona, Pennsylvania 16602

Discrimination Prohibited

Title VI of the Civil Rights Act of 1964 states: "No person in the United States shall, on the ground of race, color, or national origin, be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any program or activity receiving Federal financial assistance." Therefore, Research Training Institutes, like every program or activity receiving financial assistance from the Department of Health, Education and Welfare, must be operated in compliance with this law.

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Thomas R. Heslep, Superintendent
Altoona Area School District
7th Avenue & 15th Street
Altoona, .. 16602

To

APPLICATION FORM

SUMMER RESEARCH INSTITUTE

Computer Center, Altoona Area School District — August 14-August 25, 1967

Please type or print in ink

Name _____
(Last) (First) (Middle or Maiden)

Home Address _____
(Number) (Street) (City) (State) (Zip)

Office Address _____

Address for Reply (Please check one): ____Home ____Office

Phone _____ Social Security No. _____
(Area Code) (Home) (Office)

Date of Birth _____ Sex ____ Marital Status ____ No. Dependents (Excluding self) ____

* * * * * * * * * * * *

Present Employer _____

Title of your Position _____

Describe briefly your primary work assignments: _____

Immediate Supervisor:
Name _____ Address _____

Title _____

Please have your supervisor complete the enclosed reference form and return it directly to the address printed at the bottom of the form.

Employment Record -- Last five years only, beginning with present position.

Name and Address of Employer	Nature of Activity	Dates From	Dates To

Colleges and Universities attended

Name of Institution	Dates Attended From - To	Degree	Major

List the courses you have taken in measurement, research, and statistics

Course Title	Graduate (G) or Undergraduate (U)	No. of Semester Hours

NOTE: Evidence of successful completion of at least one graduate-level course in statistics must be provided. Evidence may be a transcript or a letter from your college graduate advisor. Please attach evidence to this application.

List the research areas or topics of major importance in your current position.

How do you plan to apply the training from this institute in your professional position as a counselor.

Please offer any information concerning your interests, responsibilities, reasons for applying, etc., which might assist the committee in reviewing your application.

I certify that the statements made by me on this application are true, complete, and correct to the best of my knowledge.

Signature of Applicant_____ Date_____

Please return completed application to: Thomas E. Long, Counselor Research Training Institute, Altoona Area School District, Sixth Avenue and Fifteenth Street, Altoona, Pennsylvania 16602

ELIGIBILITY CERTIFICATION SHEET

Applicant should complete, sign, and return with application forms.

1. Are you presently employed as a full-time elementary or secondary school counselor?
   ___Yes
   ___No

2. Are you employed in a school district located in the State of Pennsylvania or in an out-of-state school located within a radius of 200 miles of Altoona, Pennsylvania?
   ___Yes
   ___No

3. Do you have an earned master's degree in counseling and guidance?
   ___Yes
   ___No

4. Do you hold state certification as a guidance counselor in the state where you are employed?
   ___Yes
   ___No

5. Have you successfully completed at least one graduate course in statistics? (As stated elsewhere, evidence to this fact must be presented with the application.)
   ___Yes
   ___No

_____
Signature

Housing Needs Anticipated:

Please indicate below what your housing needs will be. Available accommodations will include: ___ 1. Single room

___ 2. One-half double

___ 3. Double

At present, does your school district have access to a computer?

___Yes
___No

REFERENCE FORM

SUMMER RESEARCH INSTITUTE

Computer Center, Altoona Area School District August 14-August 25, 1967

Name of Applicant _____ Applicant's Position _____

TO BE COMPLETED BY APPLICANT'S SUPERVISOR

How long have you known the applicant? _____

Please describe briefly the applicant's strongest capabilities in performing designated professional duties.

Please indicate any contribution that you feel the applicant could make as a participant in a research training institute.

We would appreciate any additional comments you wish to make.

Signature of
Applicant's Supervisor _____ Title _____

School Address _____

_____ Date _____

Please return completed form to: Thomas E. Long, Counselor Research Training Institute, Altoona Area School District, Sixth Avenue and Fifteenth Street, Altoona, Pennsylvania 16602

COUNSELOR RESEARCH TRAINING INSTITUTE
(Sponsored by Altoona Area School District in cooperation with USOE)

This form must be returned by June 7, 1967 to:

Dr. Thomas E. Long
Director of Guidance and Research
Altoona Area School District
Sixth Avenue and Fifteenth Street
Altoona, Pennsylvania 16602

( ) I accept the nomination to be a participant in the Counselor Research Training Institute in Altoona, Pennsylvania, August 14 to 25, 1967.

Please reserve for me:

( ) single room at $45.50

( ) ½-double room at $39.00

( ) double room at $78.00

Dependents, if any, who will accompany me include:

( ) wife/husband

( ) _____ sons
no.

( ) _____ daughters
no.

( ) I decline the nomination.

_____
Signature and Date

ALTOONA AREA HIGH SCHOOL
Altoona, Pennsylvania
EDGAR J. BROOKS, PRINCIPAL

ASSISTANT PRINCIPALS
GLENN E. BUTLER
OLIVER E. DREESE

May 24, 1967

The selection of candidates for the Counselor Research Training Institute nas recently been concluded. I am happy to inform you that you have been selected as a participant.

It will be necessary for you to decide and inform me if you accept this nomination no later than June 7; otherwise, this nomination will be extended to an alternate.

As stated in the announcement brochure, all participants will be housed in residence halls of the Altoona Campus, Pennsylvania State University; and all participants will be expected to attend every session of the institute.

Your nomination and acceptance is contingent upon these requirements.

Please complete the enclosed form and return it to me as soon as possible, but before June 7.

The nominees represent trained, skilled, and experienced individuals. There were many more applicants than nominations to be made.

We look forward to your arrival in Altoona and your participation in the research sessions.

Sincerely yours,

Thomas E. Long (ngm)

Dr. Thomas E. Long, Director
Counselor Research Training
Institute

ngm

Enclosure

References you might wish to purchase for your library.

Elementary Statistics, Second edition, Henry E. Garrett, David McKay Co. Inc., New York, 1962

Statistics In Psychology and Education, Sixth edition, Henry E. Garrett, David McKay Co, Inc., New York, 1966

Educational Statistics, W. James Popham, Harper and Row, Publishers, New York, 1967

Statistics for Psychologists, William L. Hays, Holt, Rinehart and Winston, New York, 1963

Elementary Statistics For Students of Education and Psychology, E.B. VanOrmer, and C.O. Williams, Keelers The University Bookstore, State College, Pa. 1940

Simplified Statistics, Robert Koenker, McKnight and McKnight, Bloomington, Illinois, 1961

MEASURES OF CENTRAL TENDENCY

The values of Central Tendency computations are twofold: First it is an average which represents all of the scores made by the group, and second, it enables us to compare two or more groups in terms of typical performance.

Measures of central tendency are used:

1. To show where the typical or central person scores within a group.

2. To serve as a method for comparing or interpreting any score in relation to the typical or central score.

3. To serve as a method for comparing the score made by an individual on two or more different occasions.

4. To serve as a method for comparing the mean achievement (age, IQ, weight, etc.) of two or more groups.

Measures of central tendency are the Mean, Median, and Mode.

THE MEAN

The mean is the common arithmetic average.

The mean formula for ungrouped measures is:

$$\text{Mean} = \frac{\Sigma X}{N}$$

Write the program and prepare the input tape to determine the mean of the following Wechsler IQ scores.

130	144	129	79	71	155	152	144	156
89	102	122	121	103	105	135	112	107
95	172	128	135	117	140	125		

Use the mean:

1. When the most stable measure of central tendency is desired.

2. When the size of each score should enter in and influence the central tendency.

3. When standard deviations and correlation coefficients are to be computed later.

4. When the central tendency measures of two or more distributions are to be averaged.(Finding a grand mean)

You can also calculate the mean from a frequency distribution:

1. By using frequency interval midpoints as scores.

2. By assuming the mean - this process involves less computation and is less time consuming when you have a large N.

THE MEDIAN

The median is the point in the distribution of scores above which and below which lies 50% of the N.

No computer program is required here. The median is a less commonly used statistic. However, if time permits, you may wish to write a program for the median.

Use the median:

1. When the exact midpoint of a distribution is desired.

2. When there are extreme scores which would definitely affect the mean. Extreme scores do not affect the median.

You can calculate the median for data grouped in frequency distributions and for ungrouped data.

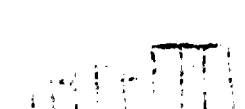
THE MODE

The mode is that score which is most frequently observed in a distribution.

No computer program is required here. The mode is also a less commonly used statistic. If time permits you may wish to prepare a program to compute the mode.

Disadvantages of the mode:

1. Occasionally one encounters distributions where two or more modes are observed. We speak of these as bimodal or trimodal distributions.



In these cases the mode loses its effectiveness as a characterization of the distribution as a whole.

2. The mode need not be located near the center of a distribution of scores.

3. The mode is sensitive to the number and size of class intervals employed.

Use the mode:

1. When a quick and approximate measure of central tendency is desired.

2. When the measure of central tendency should be the <u>most typical</u> value.

You can calculate the mode for data grouped in a frequency distribution and for ungrouped data.

VARIABILITY OR DISPERSION

Variability refers to the way scores cluster or are distributed about the mean.

Measures of variability are used:

1. To find the spread or variability of a group of scores about the mean.

2. To compare the spread or variability of two or more groups.

3. To compare the spread or variability of one group on two different occasions.

Two of the measures of variability we will discuss are the range and standard deviation.

THE RANGE

The range is the distance between the highest and lowest score.

Hi 78
Lo 32
Range = 46

Use the range:

1. When data are scattered or scanty and only a general guide as to variability is desired.

2. When a single rough measure of total spread is desired.

If time permits you might wish to write the simple program to compute the range of a set of scores.

STANDARD DEVIATION

Standard deviation is the square root of the mean of the scqures of the deviations from the arithmetical mean of the distribution.
It is an index of variability in the original measurement units.

For ungrouped data -

$$SD = \sqrt{\frac{\Sigma x^2}{N}}$$

Write a program to find the mean and SD of the following scores.

16, 12, 13, 15, 14, 16, 18, 18, 20, 19, 17, 18, 16, 15, 19, 20, 19, 20, 17, 18,

Use standard deviation:

1. When the measure of variability having the most stability is desired.

2. When extreme deviations should exercise a proportionally greater effect on the variability.

3. When the coefficient of correlation and other statistics are to be computed.

You can also compute the SD from:

1. The midpoints of grouped scores.

2. An assumed mean.

REVIEW SHEET

For SD calculations, the following columns are needed:

X	x	x^2
20 (20-19)	1	1
18 (18-19)	-1	1
23 (23-19)	4	16
17 (17-19)	-2	4
21 (21-19)	2	4
26 (26-19)	7	49
14 (14-19)	-5	25
18 (18-19)	-1	1
15 (15-19)	-4	16
18 (18-19)	-1	1
$\Sigma X = 190$		$\Sigma x^2 = 118$

$$M = \frac{\Sigma X}{N} = \frac{190}{10} = 19$$

$$SD = \sqrt{\frac{\Sigma x^2}{N-1}}$$

$$SD = \sqrt{\frac{118}{9}}$$

SD = etc.

CORRELATION (PEARSON PRODUCT MOMENT)

Correlation shows the degree of correspondance or relationship between two variables.

The formula is:

$$r = \frac{\Sigma xy}{\sqrt{(\Sigma x^2)(\Sigma y^2)}}$$

Write the program to compute the correlation coefficient between the following IQ scores.

	OTIS	BINET
A	101	133
B	137	151
C	119	145
D	124	152
E	170	157
F	155	144
G	119	140
H	142	111
I	140	150
J	122	152
K	115	137
L	125	146
M	87	128
N	120	145
O	117	153
P	135	149
Q	100	114
R	125	135
S	120	131
T	149	150
U	142	111
V	146	101
W	101	99
X	152	150
Y	114	101

Use correlation:

1. To find the relationship between two psychological traits for the same group of individuals.

2. To find the relationship between a physical trait and a psychological trait for the same group of individuals.

3. To find the relationship between two related groups on the same trait.

4. To find the predictive value of some measuring instrument on later success in some area.

5. To find the reliabity of a test.

6. To find the validity of a test.

You can also compute a correlation:

1. By the assumed mean technique.

2. By the assumed mean of zero technique.

INTERPRETING CORRELATION COEFFICIENTS

.80 - 1.00	highly dependable relationship
.60 - .79	moderate to marked relationship
.40 - .59	fair relationship
.20 - .39	slight relationship
.00 - .19	negligible relationship

REVIEW SHEET

For Pearson's r, the following columns are needed:

			$(X-\bar{X})$	$(Y-\bar{Y})$			
Case	X	Y	x	y	x^2	y^2	xy
A	14	15	-1	-5	1	25	5
B	16	20	1	0	1	0	0
C	14	20	-1	0	1	0	0
D	15	25	0	5	0	25	0
E	16	20	1	0	1	0	0
	$\bar{X}=15$	$\bar{Y}=20$			$\Sigma x^2=4$	$\Sigma y^2=50$	$\Sigma xy=5$

$$r = \frac{\Sigma xy}{\sqrt{(\Sigma x^2)(\Sigma y^2)}}$$

$$r = \frac{5}{\sqrt{(4)(50)}}$$

r = etc.

IS THE COEFFICIENT OF CORRELATION SIGNIFICANT? That is, does the r show a real or chance relationship?

To find out we assume the null hypothesis and subject the finding to a test of significance.

$$t = \frac{r\sqrt{N-2}}{\sqrt{1 - r^2}}$$

N = number of pairs
df = N - 2

To test a correlation of .80 with 27 pairs continue as follows by substituting in the above formula.

$$t = \frac{.80\sqrt{27-2}}{\sqrt{1-(.80)^2}} = \frac{.80\sqrt{25}}{\sqrt{1-.64}} = \frac{.80\,(5)}{\sqrt{.36}} = \frac{4}{.6} = 6.666$$

Referring to a t-table with 25 degrees of freedom, we check the .01 level of probability and find it to be 2.787. Since our t value is 6.666 we conclude that the correlation of .80 shows a significant relationship. There is only one chance in 100 that it could have been due to chance.

If the .01 level is exceeded it is considered a significant relationship. If the t value is between the .05 and .01 level we remain in doubt as to its significance. If it is less than the .05 level it is not significant.

TESTS OF THE SIGNIFICANCE OF THE DIFFERENCE BETWEEN MEANS

t-test for independent groups (Unmatched groups)

$$t = \frac{M_1 - M_2}{\sqrt{\left(\frac{\sum x^2 + \sum y^2}{N_1 + N_2 - 2}\right)\left(\frac{N_1 + N_2}{N_1 N_2}\right)}}$$

Write the program to test the difference between means of the following IQ scores.

X	Y
101	133
137	151
119	145
124	153
140	157
155	144
87	110
110	116
114	96
89	104
121	120

X	Y
100	89
117	114
131	103
90	101
113	98
123	96
137	114
101	119
97	88
106	
110	

Use t tests for independent groups:

1. When the groups are not matched in any manner.

2. When the performance of one individual in one group does not affect the performance of another individual in another group.

3. When the standard deviations of both groups are equal.

You can also compute the significance of a:

1. Difference between means of matched groups (Which follows)

2. Difference between mean gains of paired groups.

3. Difference between a known and observed mean.

REVIEW SHEET

For t tests of unmatched groups the following columns are needed.

Case	X	Case	Y	x	x^2	y	y^2
A	30	N	26	0	0	4	16
B	28	O	20	-2	4	-2	4
C	36	P	18	6	36	-4	16
D	24	Q	20	-6	36	-2	4
E	28	R	16	-2	4	-6	36
F	26	S	22	-4	16	0	0
G	32	T	26	2	4	6	36
H	30	U	28	0	0	8	64
I	30			0	0		
J	36			6	36		
M_1 =	30	M_2 =	22	Σx^2=136		Σy^2 =176	

$$t = \frac{M_1 - M_2}{\sqrt{\left(\frac{\Sigma x^2 + \Sigma y^2}{N_1+N_2 - 2}\right)\left(\frac{N_1 + N_2}{N_1 N_2}\right)}}$$

$$t = \frac{30 - 22}{\sqrt{\left(\frac{136 + 176}{10 + 8 - 2}\right)\left(\frac{10 + 8}{10 \times 8}\right)}}$$

t = etc.

df = $N_1 + N_2 - 2 = 16$

NOTES:

t-test for means of matched groups

$$t = \frac{M_1 - M_2}{\sqrt{\frac{N(\Sigma D^2) - (\Sigma D)^2}{N^2 (N-1)}}}$$

Write the program to test the difference between means of the following IQ scores.

X	Y	X	Y
100	113	116	104
116	101	114	114
117	99	97	107
101	104	103	98
114	113	101	100
121	130	117	114
117	114	126	132
98	101	131	149
116	104	119	123
89	100	115	132

Use t-tests for matched groups:

1. When the groups are matched at the beginning of the study. (one or more variables)

2. When treatments are different.

REVIEW SHEET

For t tests of matched groups the following columns are needed:

Pair	T_1	T_2	D	D^2
1	30	26	4	16
2	34	30	4	16
3	40	34	6	36
4	30	30	0	0
5	28	32	-4	16
6	39	34	5	25
7	46	38	8	64
8	52	46	6	36
9	46	44	2	4
10	44	48	-4	16
	$M_1=38.9$	$M_2=36.2$	$\Sigma D=27$	$\Sigma D^2 = 229$

$$t = \frac{M_1 - M_2}{\sqrt{\frac{N(\Sigma D^2) - (\Sigma D)^2}{N^2(N-1)}}}$$

$$t = \frac{38.9 - 36.2}{\sqrt{\frac{10(229) - (27)^2}{100(10 -1)}}}$$

t = etc.

NOTES:

CHI SQUARE

Chi square is the statistic by which you can compare observed versus expected frequencies. It is used to measure frequencies of occurance of non-quantified data. (for example the number passing, the number failing, yes - no, average, above average, below average, etc.)
We wish to know whether the frequencies observed in our sample differ statistically from some expected or known population of frequencies.

$$\chi^2 = \sum\left[\frac{(fo - fe)^2}{fe}\right]$$

Write the program to compute the chi square value for the following situation.

A national random sampling of 500 statisticians demonstrated that 300 of them preferred statistic book A as a reference and 200 preferred book B. Is there a significant difference in their preferences. Assume the null or equal frequency hypothesis.

Use chi square:

1. When the data are not numerical.

2. When the data are classified into categories.

3. When two or more groups are being compared and the same person does not appear in more than one group.

Cautions:

1. The sum of the fe's must always equal the sum of the fo's.

2. The categorizing of data must always be done on a logical basis.

3. The fe or fo in any category should not be less than 5. (You may combine categories to get a minimum of five in some cases)

REVIEW SHEET

In response to a certain attitudinal question, 120 counselors responded as strongly agreeing, agreeing, disagreeing, or strongly disagreeing. Are their responses equally distributed, or is a significant difference noted?

	SA	A	D	SD	Total
Observed (fo)	35	41	19	25	120
Expected (fe)	30	30	30	30	120
(fo - fe)=	5	11	11	5	
$(fo - fe)^2$=	25	121	121	25	
$\frac{(fo - fe)^2}{fe}$=	$\frac{25}{30}$	$\frac{121}{30}$	$\frac{121}{30}$	$\frac{25}{30}$	

$$\chi^2 = \sum \left[\frac{(fo - fe)^2}{fe} \right]$$

$$\chi^2 = \left[.833 + 4.03 + 4.03 + .833 \right]$$

$$\chi^2 = 9.696$$

df = (columns - 1)(rows - 1) = (4-1)(2-1) = 3

We consult the χ^2 table with 3 degrees of freedom. We find that our chi square value of 9.696 is significant at the .05 level but not at the .01 level. We conclude that there is a significant difference in the counselor's responses. Only 5 times out of 100 will chance produce a chi square value this high.

IBM PUNCHED CARD DATA PROCESSING

THE BEGINNING

The development of punched cards and the machines to process them was stimulated by the needs of the United States Census Bureau. While processing by hand the information collected during the census of 1880 as required by law, it became apparent that the processing of data to be collected during the census of 1890 would require in excess of the ten year span between each census unless better methods were developed. With this pressing need in mind, by 1887, Doctor Herman Hollerith, a statistician with the Census Bureau, had worked out the basis for a mechanical system of recording, compiling and tabulating census facts. The system employed punched holes on long strips of paper which were passed over a sensing device. This was the forerunner of today's punched card.

FUNDAMENTALS

Because IBM cards are actually units of information, they are often referred to as unit records. The machines that process IBM cards are often called unit record machines. Since "unit" means "one", the "Unit Record Principle" means that there is one and only one "record" contained on one IBM card.

The basic principle of IBM punched card data processing is that information once recorded in the form of punched holes in an IBM card may be used time and time again. Data is punched and verified and may then be sorted and summarized to produce desired results by machine processing.

Following is a list of what the punched hole will do:

1. It will add itself to something else.
2. It will subtract itself from something else.
3. It will multiply itself by something else.
4. It will divide itself into something else.
5. It will list itself.
6. It will reproduce itself.
7. It will classify itself.
8. It will select itself.
9. It will print itself on the IBM card.
10. It will produce an automatic balance forward.
11. It will file itself.
12. It will post itself.
13. It will reproduce and print itself on the end of a card.
14. It will be punched from a pencil mark on the card.
15. It will cause a total to be printed.
16. It will cause a form to feed to a predetermined position or to be ejected automatically, or to space from one position to another.

THE CARD

The IBM card is divided vertically into 80 "card columns" numbered 1 to 80 from left to right, and horizontally into 12 punching positions designated from top to bottom by 12, 11 or X, 0,1,2,3,4,5,6,7,8 and 9. The top edge of the card is known as the "12 edge" and the bottom edge of the card as the "9 edge".

Each vertical column of the card is able to accommodate a digit, a letter or a special character. Thus the card may contain up to eighty individual pieces of information.

The 12, 11 or X and 0 punches are knows as "zone punches". The 0,1,2,3,4,5,6,7,8 and 9 punches are "digit punches". Note that the 0 punch may be either a digit or a zone punch, depending upon whether it is used as a number (digit punch) or in combination with another punch to form a letter (zone punch).

THE CARDPUNCH

Data is recorded in the form of punched holes by means of a cardpunch. There are presently three different models of IBM cardpunches in general use:

1. The IBM 24 cardpunch.
2. The IBM 26 printing cardpunch differs from the 24 only in that data being punched may simultaneously be printed at the top of the column.
3. The IBM 29 cardpunch is the industry's newest and at the present time is replacing the 24 and the 26.

All three types of cardpunches may be controlled by a program card which makes possible (1) automatic skipping from one designated card column to another during the punching process and (2) automatic duplication from designated columns of one card to the corresponding columns of the following card. Automatic card feeding and ejecting are also standard features of all carupunches.

THE VERIFIER

After cards have been punched, the data in them is usually checked for punching accuracy (verified). There are presently two models of IBM verifiers in general use:

1. The IBM 56 verifier is similar in appearance and operation to the IBM 24 and 26 cardpunches.

2. The IBM 59 verifier is similar in appearance and operation to the IBM 29 cardpunch.

The theory of machine verification is that a second keypuncher will not make the same mistake as the first. The cardpunching and card verifying operations are identical except that the verifying machine does not punch the card but instead inserts a plunger into the already punched hole. If the plunger does not find a hole, the two operators have punched different keys and an error is signaled.

THE SORTER

After cards have been punched and verified, it is usually necessary to arrange them in some kind of sequence before a statement can be prepared from them. This is accomplished mechanically by using one of three IBM sorters in use today. These three machines are much alike in principle and operation and vary basically only in their speed.

1. The IBM 82 sorter operates at a speed of 600 cards a minute.
2. The IBM 83 sorter operates at a speed of 1,000 cards a minute.
3. The IBM 84 sorter operates at a speed of 2,000 cards a minute.

By means of a sensing mechanism which "reads" the punches in a card, these machines can sort cards into numerical or alphabetical order.

THE INTERPRETER

Interpreters print on a card in any desired sequence with numeric or alphabetic data which is punched in it. There are two types of IBM interpreters in general use today.

1. The IBM 548 interpreter which prints on one of two lines on a card at a speed of 100 cards a minute.
2. The IBM 557 interpreter which prints on one of twenty-five lines on a card at a speed of 100 cards a minute.

The interpreters are programmed by means of wired control panels which can be very quickly interchanged.

THE REPRODUCER

The reproducer family of IBM machines are designed basically to perform automatic high speed card punching and certain other incidental functions. Two of these machines in general usage are the IBM 514 Reproducer and the IBM 519 Document Originating Machine.

These machines have two basic functions:

1. Reproducing is the operation of sensing any or all of the punched holes in one set of cards and punching them into another set of cards.
2. Gang punching is the punching of information from a master card into each of the cards that follow it.

They can also be made to perform one or more of the following functions:

1. Comparing -- Punched data can be checked for agreement with the source.
2. Summary Punching -- Reproducers can be physically connected to an accounting machine and accumulated totals can be punched.
3. Double punch and blank column detection -- Card columns can be checked for multiple punches or for no punches.

THE REPRODUCER (Con't.)

4. Mark sensing -- Data recorded in the form of pencil marks on IBM cards can be automatically translated into punched holes in those cards.
5. End printing -- Up to eight digits can be printed on the column 1 end of the card from punches in that card or in another card. This function can be performed only by the IBM 519 Document Originating Machine.

All functions discussed are controlled by interchangeable wired control panels. Some of these functions may be performed simultaneously.

THE COLLATOR

The IBM collators are filing machines that arrange cards in the order desired for subsequent operations or for filing. There are three IBM collators in general use today: the IBM 85, 87 and 88. They perform the same basic functions with the main difference being speed of operation. The 85 and 87 can operate at a maximum speed of 480 cards a minute while the newer model 88 can feed a maximum of 1300 cards a minute.

The principle function of the collator is to feed and compare two files of punched cards simultaneously to match them or combine them into one file. At the same time, cards in each file that do not match those in the other can be separated automatically from the rest of the file. Also at the same time the sequence of cards can be checked in one of the files. Again, all operations are controlled by a wired panel.

THE ACCOUNTING MACHINE

Printing is one of the most important functions of the three IBM Accounting Machines in use today, namely the IBM 402, 403 and the 407. It is through the medium of printing that the finished products of a data processing system are produced. These products are various types of printed reports and document forms.

In addition to performing the important function of printing, IBM Accounting Machines have the ability to (1) summarize in counters capable of addition and subtraction the numerical data punched in a file of cards; (2) print the summarized data -- that is sub-totals and final totals -- whenever required; (3) punch summarized data into cards when connected to another machine capable of summary punching and (4) position continuous paper forms automatically to the line where the data should be printed.

RESEARCH INSTITUTE
Daily Schedule
First Week

Sessions A.M. 8:30 - 12:00
P.M. 1:00 - 4:00

Monday, August 14	A.M.	Introductions, orientation, administrative details, tour - Room 236 Consultant's Speech - "The Counselor as a Researcher and Data Analyst" Group A - Data processing room, Room B-2 Introduction to the IBM card and key punch Group B - Room 236 Fortran programming, card input
	P.M.	Groups A and B interchange
Tuesday, August 15	A.M.	Group A - Room B-2 Use of the sorter Group B - Room 236 Fortran programming
	P.M.	Groups A and B interchange
Wednesday, August 16	A.M.	Group A - Room B-2 Use of the interpreter and reproducer Group B - Room 236 Fortran programming
	P.M.	Groups A and B interchange
Thursday, August 17	A.M.	Group A - Room B-2 Use of the collator Group B - Room 236 Fortran programming
	P.M.	Groups A and B interchange
Friday, August 18	A.M. and P.M.	- Groups A and B, Consultation, practice, and individual work.

DAILY SCHEDULE
Second Week
(ALL ACTIVITIES INCLUDE BOTH GROUPS A AND B)

Monday, August 21	A.M.	Instruction in the use of the remote terminals with tape input.
	P.M.	Consultant's Speech "Types of Data Needing Analysis in Today's Schools"
		Theory of statistical measures Applicability of the computer in data analysis
Tuesday, August 22	A.M.	Central Tendency Standard deviation Correlation
	P.M.	Program preparation and run
Wednesday, August 23	A.M.	Chi square
	P.M.	Program preparation and run
Thursday, August 24	A.M.	Tests of significance between means
	P.M.	Program preparation and run
Friday, August 25	A.M.	Individual work, consultation, program preparation and run
	P.M.	Program preparation and run Evaluation and program critique

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DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
OFFICE OF EDUCATION

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TITLE

Final Report - Counselor Training in Statistical Analysis Via Electronic Processing for Research on Local and Regional Student Data

PERSONAL AUTHOR(S)

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RETRIEVAL TERMS

Research Training
Counselor Training
Remote Terminals
Computer Analysis
Statistical Analysis
Electronic Processing
Student Data
Local Research
Regional Research

IDENTIFIERS

ABSTRACT

In this institute the participants were trained to use peripheral computer related equipment; they were taught Fortran programming skills so they might write and redimension statistical formulary programs, and they were trained to assemble data so they might access computers via both card and punched-tape input. The training in punched-tape input involved the use of remote terminal equipment, which is available to most school systems today.

The objectives of the Institute were to train counselors to better collect, assemble, analyze, and report school and student related data to those consumers of such data in our society by: (1) teaching hollerith data processing card characteristics; (2) teaching trainees how to use the key-punch, sorter, collator, alphabetic interpreter, and card reproducer; (3) teaching Fortran programming techniques; (4) reviewing the statistical concepts of central tendency, correlation, standard deviation, chi-square, and t-tests of significance and relating these procedures to electronic analysis of available student data; (5) teaching trainees to operate teletype remote terminals; and (6) offering a supervised practicum in statistical program writing and the use of data processing and computer accessing equipment.

The training also attempted to encourage counselors to engage in cooperative research and analysis endeavors with other schools in the area, thereby gaining insight into school and student characteristics on a regional basis.