

HOW WELL ACQUAINTED ARE  
JUNIOR AND SENIOR HIGH SCHOOL  
COUNSELORS WITH  
ELECTRONIC DATA PROCESSING?

THESIS  
PRESENTED TO THE FACULTY OF THE DEPARTMENT  
OF PSYCHOLOGY  
UNIVERSITY OF HOUSTON

IN PARTIAL FULFILLMENT  
OF THE REQUIREMENTS FOR THE  
DEGREE OF MASTER OF ARTS

by  
CATHERINE M. PORTER  
August, 1966

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## AN ABSTRACT

How many of us actually know what automation is? Automation, in our minds, has something to do with computers, IBM machines, and electronic brains. No wonder we dread the age of automation--most people do not accept readily new ideas they do not understand. Many schools today are developing new curriculums in teaching data processing to high school students. Data processing is becoming an important facet of our civilization and in our personal lives. Thus, it is important for students to learn about data processing and how it affects them as individuals. What about the counselors? They, too, must realize the importance and potential of data processing and automation. The counselor must be familiar with every aspect of data processing so that he may effectively counsel the students under his guidance. The counselor holds in his hands the future of tomorrow's America. Automation will provide the backbone of our industrial nation, and it is imperative that automation be understood.

The purpose of this study was to determine the knowledge of automation and data processing held by secondary school

counselors in a large Southern school district.

Answers were sought to such question as: Do counselors realize how useful computers can be in scoring, evaluating, and analyzing the data with which every counselor must deal? Are counselors familiar with the various occupations in data processing? Does the counselor know enough about automation to tell a student what the basic skills or requirements are for obtaining employment in the data processing area? How aware is the counselor of changes in the work world? How effectively can the counselor guide a student without the counselor's having a formidable knowledge of the labor market and the creation or obsolescence of jobs?

This study was designed to analyze the counselor's knowledge of automation and data processing with the hope of taking remedial measures to insure the counselor's effectiveness in the guidance of students with respect to automation and its allied fields.

The "Questionnaire Test" sent to the counselors consisted of twenty-five items which required a true or false response. The twenty-five questions were assigned to four categories.

The relationships observed were those between the total scores and items of the "Questionnaire Test" and the actual correct answers. These data were analyzed according to subgroups of junior high, senior high, male, and female.

In general, it was found that every item on the "Questionnaire Test" was statistically significant at the .01 level of confidence.

Ten items had accuracy percentages of 67 percent or less. These items belonged to categories II, III, and IV.

Category II contained some of the lowest percentages. Counselors did not seem to be familiar with the duties or qualifications of various data processing occupations. Category III dealt with counselor awareness of a changing work world. Most counselors did not seem to realize how automation affected job stability or job classifications. Counselors did not seem to realize how computers had affected the labor market, employment rates, or job obsolescence. This information is vital in the guidance of a student choosing a vocation.

The item with the lowest percentage of correct answers was item twenty-five. The school system used in this study teaches the operation of Unit Record equipment in a two-year vocational data processing program. Only 32.8 percent of the counselors knew that Unit Record equipment was not a large scale computer system! In general, it was found that counselor knowledge was weakest in the area of data processing occupations.

It was recommended that counselors, guidance instructors, or administrative personnel set up local norms for their particular school population. The results obtained in this study are of use only in the specific school system in which the analysis was conducted. It was stressed that counselors acquaint themselves with data processing occupations. Major computer companies have been quite cooperative with educational administrators in setting up programs to help counselors and interested teachers learn about automation and data processing. Counselors are urged to make contacts in industry, as these furnish a good first hand report of what is expected in certain occupations.

The author also discussed additional items which might be included in a revision of the present "Questionnaire Test." These are questions regarding the counselor personally.

Finally, it was suggested that administrators arrange for seminars, lectures, and other educational programs to help their counselors attain a better understanding of automation and electronic data processing. Such methods are extremely important to effective counseling.

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C. M. P.

The University of Houston  
Houston, Texas  
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## CHAPTER I

### THE PROBLEM

#### Introduction

How many of us actually know what automation is? Automation, in our minds, has something to do with computers, IBM machines, and electronic brains. No wonder we dread the age of automation---most people do not accept readily new ideas they do not understand. Many counselors and educators need to enlarge the scope of their understanding of automation, so they may better fulfill their obligations to the persons whom they are counseling.

Let us examine the implications of data processing and automation on the counselor's own field. The counselor spends much time recording the vast amount of data for each youngster he counsels. There are numerous scores for each individual, which include such things as achievement scores, IQ scores, personality inventories, as well as grades, interests, abilities, aptitudes, and other meaningful data. The counselor spends hours evaluating this information in an attempt to analyze what course of action will be best for his counselee. In business, information retrieval has been successful in relieving thousands of people of the drudgery of copying

multitudinous data, and has released businessmen for more creative activities. If it can be done in business, why can't data processing be utilized successfully in counseling? The information concerning a given student can be stored in a computer so that it can be compared to another student's scores, or to the scores of any group of students. The computer is capable of making analyses from the information it has stored, just as the counselor is able to make his personal analyses. But how can a computer do this successfully? Computers are instructed to perform certain operations. This is known as "programming". Before a counselor makes his analysis, he follows a certain logical sequence of events in his mind, though he may not be aware of these thought processes. A counselor who fully investigates his own approach to a problem could certainly explain the processes to another person who is more familiar with the "programming" techniques of the computer. A team working in this way will be able to construct a full and complete set of instructions for the computer, which will not only be a time saving device for the counselor, but will also be interesting to him as he observes the variables concerned with individual differences. Since a computer operates with electronic circuitry, decisions can be reached in approximately a millionth of a second.

whereas a man's thinking processes, by the time they have been verbalized, may take several hours. The counselor can use the computer's work for drawing whatever creative conclusions he may wish to make. So again a computer may be used to do the heavy "brain work" (or repetitive chores) which burden men with the tedious. This type of automation may not be economically feasible for one school system, particularly if the system is small, but sometimes, joint ventures may be worked out with several school systems participating. This is certainly an idea worthy of thoughtful consideration.

While automation may be useful to the counselor in his own work, how else may it affect other aspects of his sphere of influence? How familiar is the counselor with the various occupations existing in the data processing industry? He may know they exist, but how proficient is he in explaining the duties of a data processing position? Could he tell a student exactly what a systems analyst or a programmer does in his job? What amount of training is necessary to qualify for such work? There are many jobs in data processing which should be known to counselors. These include a hierarchy headed by a senior systems analyst (or systems engineer), a systems analyst, a senior programmer, a programmer, a computer operator, a tab operator, and a key punch operator.

Why is it so important for counselors to be familiar with these jobs? More and more school systems are adopting computer and data processing curriculums. The public is begging for information and training. Businesses are becoming more computer-oriented and it is becoming more economically feasible for even small businesses to acquire data processing equipment. The demand for qualified operators is enormous but the supply is very small.

The counselor also needs to be aware of the qualifications of a particular job in data processing so he can evaluate any students who may be able to work in the data processing field. Many jobs in data processing do not demand any higher intelligence quotients than other types of clerical work, but the counselor should know the general aptitude required for each job classification in the field. These jobs vary widely, and a careful analysis of a student with these occupations in mind is a very delicate procedure. Far too often, a student is overlooked because a counselor did not have the real facts about a data processing occupation.

How else is the counselor affected by automation? Many counselors have already discussed the rapid changes which have been precipitated by automation. We are living in a world of change. A few years ago, a man could train for an

occupation and expect to do the same job for the rest of his life. But automation has wreaked havoc on the 8-to-5 day, as well as on a lifetime occupation. No one could have dreamed of the changes which have taken place in the last fifteen years. Just fifteen years ago, the first commercial computer was unveiled. Now its descendents have changed our whole pattern of living.

Let us look more closely at what has been done in industry in the age of automation. Automation is used for business accounting, scientific work, space travel, hospital and medical analysis and diagnosis, real time (concurrent) updating of information, mixing of foods, communications, and several hundred other fields. Computers do jobs in factories such as milling, grinding, the automatic handling of materials, making mechanical parts, assembling products, and hundreds of other tasks. ✓

Basically, there are four types of automation. The first and most familiar is what is sometimes called "Detroit" automation. This is the control of machinery and power equipment by computers. This type of automation is used in factories and plants.

The second type of automation is concerned with the feedback of information from a process which is used to make

changes in the performance of a machine. This is called cybernation, or a type of process control. It is used in the petrochemical industry and mixing industries to control automatic processes.

The third type of automation is called numerical control. This involves the storing of mathematical values on magnetic and paper tape of a computer. These values represent steps in a "program" for the job to be performed. For example, the pattern a machine will follow in making a bolt or drilling a hole is fully under program control.

Electronic data processing is the fourth type of automation. An electronic computer records, stores, and analyzes information in millionths of a second. This is known as information processing. It is generally utilized in business and commercial applications.

The counselor now must give serious thought to analyzing the labor market. Does automation actually create unemployment? Rader (17) reports that between 1953 and 1959, the United States had some 200,000 workers a year who lost their jobs as production workers. But, in 1963 alone, one million people were added to the labor force, and from 1947 to 1963, employment increased from 57.8 million to 69.1 million. The actual percentage of workers who are unemployed is also at a record low. It appears that automation does not destroy

jobs, but actually creates them. It seems to be a matter of retraining these workers, and again industry is looking to education for assistance.

Why are automation and change so fearful to us? We are afraid of the unknown. The counselor is in the position of being able to assist people in conquering the unknown world of automation. Through knowledge and understanding, data processing and automation will cease to be obsenities, and will become allies instead of the dreaded enemy. A counselor who faces the future and prepares his students for the challenge of change will be the answer to the "threat" of automation.

#### Statement of the Problem

The purpose of this study was to analyze responses on a "Questionnaire Test" which was sent to junior and senior high school counselors in a large city school system. Answers were sought to such questions as: Do counselors realize how useful computers can be in scoring, evaluating and analyzing the multitudinous data with which every counselor must deal? Are counselors familiar with the various occupations in electronic data processing? How proficient is the counselor in explaining the duties and job qualifications of a data processing occupation? Could a counselor tell a student exactly what a systems analyst or a programmer does in his job?



Could a counselor furnish a student with good, valid information about the data processing industry itself? How aware is the counselor of changes in the work world and job classifications and their relationship to automation? How effectively can the counselor guide a student without the counselor's having a formidable knowledge of the labor market and the creation or obsolescence of jobs?

In other words, the purpose of this study was to analyze data gathered from the questionnaires answered by practicing counselors in a large metropolitan school district, in order to ascertain any significant relationships between counselor responses and the actual correct responses.

It is the intent of this study, therefore, to make an analysis of the data gathered on a particular group of counselors and to observe and report any significant trends. It is not the purpose of this study to predict trends for any other sample populations of counselors. Any trends reported as "significant" in terms of this study will apply only to this particular population, in that the results are significant statistically. It is the hope of the author that this study will inspire counselors, administrators, and educators, or other such persons, to make such an analysis of their particular school population. It is only in the

setting up of local norms for specific populations that any analysis could be useful.

#### Limitations of the Study

— One of the limitations of this study is the fact that — the analysis was performed on a relatively small sample of counselors. This sample (N=113) represents 77.4% of the total number of junior and senior high school counselors in the school system.

Another possible limitation of the study is that it cannot be used for future predictions concerning other samples in other school districts. What is true for this particular sample may not apply to other samples. The results might be only of use specifically to the district in which the analysis was conducted.

## CHAPTER II

### REVIEW OF RELATED LITERATURE

The literature contains a multitude of data concerning articles on the various effects of automation on psychology and other areas of human behavior. Most of the literature seems to be of a descriptive nature rather than actual statistical studies which attempt to determine the role of the counselor in a cybernated society.

This seems to indicate an important need to appraise the extent to which counselors have modernized their thinking with respect to the automated society, and to stimulate professional interest in the counseling implications of automation.

The following studies reviewed here were selected because of their relation to this particular study. The professional recognition of the topics discussed should reveal that these problems are indeed a reality. Considerable attention has been given to articles dealing with such topics as: adjusting to change, guidance research and information retrieval accomplished by the utilization of electronic computers, and the recognition of personnel problems of adjustment in new computer installations.

Diebold (7) wrote an article which describes the effects of automation on industry. Automation has brought changes in

factory production, controlling and scheduling of work loads and products, simulation techniques which eliminate much expensive experimentation, and various other uses. Counselor's tasks are also facilitated through new and rapid analyzing of data. Diebold stresses the importance of counselors accepting changes brought about by automation, and urges them to learn to assist their clients in accepting this change as soon as possible.

Hart and Lifton (8) conducted a study to examine psychological effects resulting from technical changes. The authors' definition of automation is "a self-regulating machine that does mechanical work, and regulates and controls the work automatically." The authors anticipated that about 45% of the population will be affected by technical changes. "White collar groups will now face large, relative, and perhaps even absolute reductions in their numbers." Adults will be affected and their values changed, as well as children.

They believe that the compulsion to work will be greatly lessened due to the decrease of its role as a disciplining agent. There will probably therefore be an increase of leisure time. Counselors must make leisure time emotionally productive. The attitude toward time may change also. Time has always been considered precious. With automation, we may assume that time will be abundant.

The authors say that labor will be upgraded and some workers will be displaced. Others, who are unemployed because they are unemployable and lack basic ability to be trained, face a severe problem. Thus the question is raised: what can a counselor do for these people?

Managerial positions, the authors say, will also be affected, since automation will be able to do much detail work for managers as well. Women employees will be affected, due to automatic processing of clerical work and machine operator work. Married women will probably be returned to the home. For the first time, it seems that the whole population will face a vast amount of leisure time. There may be much more socialized activity.

These thoughts were brought to the attention of counselors with the expressed hope of the authors that if the counselors intend to play a vital role, it is indeed time for them to consider their course of action now.

Kinling (9) conducted an interesting study concerning the use of data processing equipment in furnishing guidance information to teachers.

A pilot study was made in Baltimore, Maryland, using one grade in each of six high schools and one entire senior high of 1800 pupils. Guidance information was obtained from

cumulative records. It was estimated that it would take a teacher at least nine hours to look up this information. The information was: name, homeroom, birth, sex, IQ decile, curriculum pursued, type of school attended the previous year, transported by bus, clinical report on file, number of days absent last year, achievement test scores, National Merit Scholarship Qualifying Test scores, and local options.

Listings were prepared of homeroom rolls, class rolls, pupils ranked by IQ decile, pupils ranked by test score deciles, pupils arranged by birth date. Three copies were made for the principal, counselor, and the teacher.

The author reports that the use of data processing equipment for guidance information freed counselors and teachers from several needless and dull hours of tedious work.

Kushner (10) reports a study which offered several suggestions to employers and other interested parties for overcoming personnel fear and opposition to a successful computer installation.

Cresap, McCormic and Paget did many computer studies on the success and failure of computers in industry. It was found that reactions of people are usually negative unless management shows employees the positive aspects of the change to data processing. "Employees should be assured that even

though their jobs may change, they are in no danger of losing their livelihood." Employees must be trained and oriented for new jobs and new responsibilities. High value is placed on the ability of the employee to adjust. "People who are most affected by large scale change frequently are the longest service employees." Younger employees can be more readily reabsorbed into the organization. Many higher clerical grades are eliminated. With fewer of these jobs there seems to be less opportunity to advance.

Employees must be educated on the reasons for the change, the extent of change, the character of the equipment, and the anticipated effect of change on the personnel.

The author concludes that automation has caused considerable fear and anxiety among employees. This fear needs to be conquered. Employees should be taught about computers and automation in order to allieviate fear of the unknown.

Megginson (13) in his study, attempts to evaluate the probable impact of automation on personnel policies in the future.

The author found that computers, when first utilized in 1948, were often misused by management and manufacturers.. They were frequently assigned jobs they could not accomplish. Thus, the fear developed that computers would downgrade human mental activity in business. This was not true. Machines are

given boring and tedious paper work, and men are freed to do more interesting and creative work.

The author believes that people are able to contribute much to the successful application of machines to routine business functions. An early prediction was that the introduction of computers would produce widespread unemployment. Far greater volumes of opportunities have followed automation than those under slower and more awkward methods.

The author mentions that Peter F. Drucker has suggested that "automation may bring about more large scale labor displacement in office jobs than in any other field of employment." But the author emphasizes the point that displacement is not synonymous with unemployment. The author contends that unemployment occurs when employees fail to adapt themselves to new jobs and new opportunities. Managers with high intellect, the ability to think logically, and the ability to reason abstractly are desperately needed. Technical personnel in skilled manpower will be needed for the operation of computers. Necessary training will be furnished on the job, and will be supplemented by courses given by equipment manufacturers and universities. Schools must do their part, and a high school curriculum will be needed, as well as college and university training.



Morman, (16) in his article, stresses the importance of informing counselors of the importance of learning about automation and data processing. The author asserts that automation will affect every occupational level in this country. By 1970 there will be more white collar workers than blue. There will be an upgrading of the labor force due to automation. New training will be needed for displaced workers. Workers need to be prepared for change. This is the counselor's responsibility. Counselors need to keep abreast of automation and new developments. The D. O. T. and the Estimate of Worker Traits have no descriptions for many new jobs in data processing. Counselors should read potential sources of information on automation. There are many books and magazines in this field. Manufacturers of computer equipment sometimes offer courses to teachers and counselors. Counselors should take courses in the field to gain actual experience which would be helpful to them in later counseling of students.

In general, all these studies and articles point out the extreme importance of the role of the counselor in our changing world. Automation has brought many changes in the world of work: shorter hours, more leisure time, the elimination of old jobs, the creation of new ones, and a great

amount of anxiety in employees who fear that their jobs are to become obsolete through automation.

These and other problems can be solved if the counselor is able to see his own role clearly. The counselor must know and understand the forces behind automation--its causes and its effects. Only then can the counselor hope to help his clients achieve a rational and mature approach in solving their own personal problems. Until the counselor understands how automation is affecting the work world, he will not be able to assist his clients in purposeful decision making. He, too, will share their fears and uncertainties about computers and our cybernated society. Whether automation is to become a threat or a promise depends solely on the counselor.

### CHAPTER III

#### INTERPRETATION OF FINDINGS

##### The Sample Group

The basic sample group for this study consisted of 113 counselors in a school system in a large city in the South. The counselors were actively counseling from September, 1965 to June, 1966. The school district had a total of over 220,000 students; 45,101 in junior high schools, and 34,352 in senior high schools. Of the June, 1966 graduates, 72.8% planned to enter college. The counselor's job, therefore, seems to be even more meaningful and important.

In order to become a counselor in this school district, the applicant must have at least three years teaching experience, hold a state certificate in counseling, and have a Master's degree.

##### Test Materials Used

The "Questionnaire Test" sent to the counselors consisted of twenty-five items which required a true or false response. The twenty-five questions were assigned to the following categories:

- I. The recognition of computers by counselors for information retrieval and data analysis of counselor testing information.
- II. The familiarity of counselors with the duties and qualifications of occupations in electronic data processing.
- III. Counselor awareness of changing world and living habits.
- IV. Counselor knowledge of the labor market, job obsolescence, employment rates, and job stability.

Table I consists of an analysis of responses to the twenty-five items on the questionnaire. The total number of true and false responses per item are listed. Some counselors did not answer either true or false, although the instructions stated, "Check one." Such failure to answer would seem to indicate the response "I don't know the answer." Thus, the "No Response" figures take on added meaning.

Table II is a breakdown of "Questionnaire Test" distribution and "Questionnaire Test" return. Out of 146 "Questionnaire Tests" distributed, 113 were returned. This represents 77.4% of the total sample. Of the male counselors, 82.4% returned the "Questionnaire Test", while only 74.7% of the female counselors returned their "Questionnaire Tests". Of the junior high counselors, 75.7% returned the "Questionnaire Test", while 78.8% of the senior high counselors returned their "Questionnaire Tests".

TABLE I

ANALYSIS OF RESPONSES TO ITEMS ON THE  
"QUESTIONNAIRE TEST"

<u>Item</u>	<u>Number True</u>	<u>Number False</u>	<u>No Response</u>	<u>Correct Responses</u>	
				<u>Number</u>	<u>Percent</u>
1	99	11	3	99	87.5
2	12	98	3	98	86.6
3	7	104	2	104	92.0
4	1	111	1	111	98.2
5	62	47	4	62	54.9
6	67	38	8	67	59.2
7	36	59	8	59	52.1
8	101	10	2	101	89.5
9	6	107	0	107	94.6
10	5	108	0	108	95.6
11	5	108	0	108	95.6
12	26	84	3	84	74.4
13	22	83	8	83	73.5
14	59	26	28	59	52.1
15	62	28	23	62	54.9
16	86	8	19	86	76.1
17	104	6	3	104	92.0
18	29	76	8	76	67.2
19	92	12	9	92	81.4
20	88	15	10	88	77.9
21	38	60	15	60	53.1
22	18	82	13	82	72.5
23	24	71	18	71	62.8
24	20	68	25	68	60.0
25	50	37	26	37	32.8

TABLE II

"QUESTIONNAIRE TEST" DISTRIBUTION

	<u>Male</u>	<u>Female</u>	<u>Total</u>
<u>Senior High Counselors</u>	30	50	80
<u>Junior High Counselors</u>	21	45	66
<u>Total Number Counselors</u>	<u>51</u>	<u>95</u>	<u>146</u>

TABLE III

"QUESTIONNAIRE TEST" RETURN

	<u>Male</u>	<u>Female</u>	<u>Total</u>
<u>Senior High Counselors</u>	25	38	63
<u>Junior High Counselors</u>	17	33	50
<u>Total Responses</u>	<u>42</u>	<u>71</u>	<u>113</u>

There is an average of 683 students per junior high counselor, and about 429 students per senior high counselor. It is interesting to note that a smaller percentage of junior high counselors than senior high counselors responded although the junior high counselors have a greater number of students to counsel. Although data processing classes are offered only at the senior high level, students must prepare their curriculum program at the junior high school level. Thus, it is equally important for junior high counselors to have knowledge of data processing.

### Procedures

The "Questionnaire Test" was prepared by the author. Considerable attention was given to common fallacies about automation and computers. These were incorporated into the "Questionnaire Test" as a means of determining whether or not counselors believed these ideas. There were seventeen questions assigned to category II because the author believed that counselor knowledge in the area of data processing itself was of more importance than knowledge in any of the other three areas. The other main area of importance was category IV. Seven questions were assigned to this category.

The "Questionnaire Test" was designed specifically with a true-false format because of the ease of response and the facility of evaluation and grading.

Copies of the "Questionnaire Test" were sent with a letter to each individual counselor with the hope that personalized letters would bring a larger response and create more interest. The list of acting counselors was obtained from the Supervisor of Counseling of the school district. The supervisor was most cooperative and displayed much interest and enthusiasm for the study.



## QUESTIONNAIRE TEST

CONFIDENTIAL - (There is no passing or failing grade!)

All questions are True-False. (Check one)

- | T   | F   |                                                                                                                                                   |
|-----|-----|---------------------------------------------------------------------------------------------------------------------------------------------------|
| ( ) | ( ) | 1. A counselor's job could be made easier by a computer.                                                                                          |
| ( ) | ( ) | 2. Computers have eliminated more jobs than they have created.                                                                                    |
| ( ) | ( ) | 3. Computers have caused widespread unemployment.                                                                                                 |
| ( ) | ( ) | 4. Computers are bad for our economy.                                                                                                             |
| ( ) | ( ) | 5. The unemployment rate is at an all time low.                                                                                                   |
| ( ) | ( ) | 6. By 1970, there will be more white collar workers than blue collar workers.                                                                     |
| ( ) | ( ) | 7. Computers and automation have helped keep job classifications more stable with less change.                                                    |
| ( ) | ( ) | 8. There will be many jobs which will be obsolete in the near future due to automation.                                                           |
| ( ) | ( ) | 9. A computer can think as a human thinks.                                                                                                        |
| ( ) | ( ) | 10. Computers are more intelligent than humans.                                                                                                   |
| ( ) | ( ) | 11. We can ask a computer any question and it will give us the answer.                                                                            |
| ( ) | ( ) | 12. A student must have a relatively high IQ to be qualified to work in Data Processing (115 or above).                                           |
| ( ) | ( ) | 13. A key punch operator is trained to operate a computer.                                                                                        |
| ( ) | ( ) | 14. "Unit Record" equipment is a punched card data processing system.                                                                             |
| ( ) | ( ) | 15. By 1954, American firms had spent a total of 47 million dollars on computer equipment.                                                        |
| ( ) | ( ) | 16. American firms spend one billion dollars a year on data processing equipment.                                                                 |
| ( ) | ( ) | 17. The data processing industry is one of the fastest growing industries in the world today.                                                     |
| ( ) | ( ) | 18. The holes in IBM cards are not alphabetic or numeric characters.                                                                              |
| ( ) | ( ) | 19. Computer programming is the preparation of a program in computer language which tells the computer what steps to follow in solving a problem. |
| ( ) | ( ) | 20. The holes in IBM cards are punched by a key punch.                                                                                            |
| ( ) | ( ) | 21. A computer can distinguish a blue IBM card from a white card (i.e., can distinguish color changes in cards).                                  |
| ( ) | ( ) | 22. A systems analyst is the same as a programmer.                                                                                                |
| ( ) | ( ) | 23. A systems engineer operates a computer.                                                                                                       |
| ( ) | ( ) | 24. A tab operator pulls tabs from magnetic tape reels.                                                                                           |
| ( ) | ( ) | 25. Unit Record equipment is a large computer system.                                                                                             |

It is not necessary to sign your name on this sheet.  
You may, if you wish.

### Definition of Terms Used

This glossary is furnished in order to clarify the meaning of both the thesis and "Questionnaire Test".

Terminology is of great significance in the electronic data processing industry. In more complex situations in data processing, there is often the stumbling block of weak terminology. This interferes with the communication of various groups of data processing personnel. Therefore, a general glossary of terms is indispensable in order to avoid such confusion. It offers the means to achieve standardization in the use of a somewhat specialized vocabulary.

Automation. Automation is the investigation, design, development and application of methods of rendering processes automatic, self-moving, or self-controlling.

Computer. A computer is a device capable of solving problems by accepting data, performing prescribed operations on the data, and supplying the results of these operations. Various types of computers are calculators, digital computers, and analog computers.

Data Processing. Data Processing is a systematic sequence of operations performed on data.

Data Processing Systems. A data processing system is a network of machine components capable of accepting information, processing it, and producing the desired results.

Key Punch. A key punch is a device to record information in cards by punching holes in the cards to represent letters, digits, and special characters.

Programmer. A programmer is one who prepares programs for a computer. He codes, tests, and debugs programs.

Programming. Programming is the art of reducing the plan for the solution of a problem to machine sensible instructions.

Systems Analysis. Systems analysis is the analysis of a business activity to determine precisely what must be accomplished and how to accomplish it.

Systems Analyst. A systems analyst prepares charts, tables, and diagrams to assist in analyzing problems, utilizing, if necessary, various business, scientific and/or engineering mathematical techniques. He devises logical procedures to solve problems by electronic data processing, keeping in mind the capacity and limitations of equipment, operating time and form of desired results. He analyzes existing system logic difficulties and revises the logic and procedures involved as necessary.

Unit Record. A unit record is historically a card containing one complete record. It is currently the punched card.

Cybernetics. Cybernetics is the field of technology involved in the comparative study of the control and intra-communication of information handling machines and nervous systems of animals and man in order to understand and improve communication.

Tab Equipment. Tab equipment is the machines and equipment using punch cards. The group of equipment is called tabulating equipment because the main function of installations of punch card machines for some 20 years before the first automatic digital computer was to produce tabulations of information resulting from sorting, listing, selecting, and totaling data on punch cards. This class of equipment is commonly called EAM or tab equipment.

Tab Operator. A tab operator is a person who operates tabulating machines, accounting machines or any other unit record equipment.

## CHAPTER IV

### PRESENTATION AND ANALYSIS OF DATA

The basic data for this study consisted of the scores made by the sample group of one hundred-thirteen counselors who actively counseled from September, 1965 to June, 1966, on the "Questionnaire Test." These data have been arranged in tabular form and are presented in Tables IV through VII.

In Table IV the mean and the standard deviation are shown. The scores and frequencies are included in this table.

Table V through VI consist of the scores broken down by such categories as male, female, junior high, and senior high.

Table VII shows the male and female responses on the items, the percentages of total responses, which are correctly answered, and a breakdown into percentages of the total number of males and females responding. The standard error of the percentage total is also shown. The standard formula for computing the standard error was used.

TABLE IV

Frequencies

<u>Score</u>	<u>Total</u>	<u>Male</u>	<u>Female</u>
25	1	0	1
24	4	2	2
23	12	7	5
22	8	4	4
21	11	3	8
20	11	4	7
19	6	0	6
18	17	6	11
17	10	4	6
16	8	2	6
15	8	4	4
14	6	0	6
13	6	3	3
12	0	0	0
11	1	1	0
10	2	0	2
9	1	1	0
6	1	1	0
	<u>113</u>	<u>42</u>	<u>71</u>
	N = 113	N = 42	N = 71

Mean = 18.3

Standard Deviation = 3.7

TABLE V

## ANALYSIS OF SCORES MADE BY JUNIOR HIGH COUNSELORS

<u>Score</u>	<u>Total</u>	<u>Male</u>	<u>Female</u>
25	0	0	0
24	2	1	1
23	7	4	3
22	4	2	2
21	5	0	5
20	7	2	5
19	3	0	3
18	7	2	5
17	6	3	3
16	1	0	1
15	2	1	1
14	1	0	1
13	2	0	2
12	0	0	0
11	1	1	0
10	1	0	1
9	0	0	0
6	<u>1</u>	<u>1</u>	<u>0</u>
	N = 50	N = 17	N = 33

TABLE VI

## ANALYSIS OF SCORES MADE BY SENIOR HIGH COUNSELORS

<u>Score</u>	<u>Total</u>	<u>Male</u>	<u>Female</u>
25	1	0	1
24	2	1	1
23	5	3	2
22	4	2	2
21	6	3	3
20	4	2	2
19	3	0	3
18	10	4	6
17	4	1	3
16	7	2	5
15	6	3	3
14	5	0	5
13	4	3	1
12	0	0	0
11	0	0	0
10	1	0	1
9	1	1	0
6	0	0	0
	<u>        </u>	<u>        </u>	<u>        </u>
	N = 63	N = 25	N = 38



TABLE VII

## ANALYSIS OF ITEMS

<u>Item</u>	<u>% Items Correct</u>	<u>% Female</u>	<u>% Male</u>	<u>% Total Standard Error</u>
1	87.5	93.0	78.5	.031
2	86.6	88.8	83.4	.034
3	92.0	94.5	88.0	.025
4	98.2	97.1	100.0	.024
5	54.9 ✓	52.1	59.5	.047
6	59.2 ✓	53.5	69.0	.046
7	52.1 ✓	46.5	64.3	.047
8	89.5	88.6	90.5	.029
9	94.6	93.0	97.6	.021
10	95.6	95.7	95.2	.019
11	95.6	95.7	95.2	.019
12	74.4	64.9	90.5	.041
13	73.5	66.2	85.8	.042
14	52.1 ✓	55.0	47.6	.047
15	54.9 ✓	59.1	47.6	.047
16	76.1	79.0	71.4	.040
17	92.0	93.0	90.5	.025
18	67.2 ✓	74.6	54.8	.044
19	81.4	84.5	76.1	.037
20	77.9	76.0	59.5	.039
21	53.1 ✓	47.9	62.0	.047
22	72.5	76.0	66.6	.042
23	62.8 ✓	64.9	59.5	.045
24	60.0 ✓	60.5	59.5	.046
25	32.8 ✓	32.7	33.4	.044

In the analysis of the data presented in Tables IV through VII, the focus will primarily be upon trends indicated by results. These trends do not necessarily represent predictions but rather serve as inferences about such data.

Graph I consists of the frequency (number in sample) versus the score on each "Questionnaire Test." The mean of the sample was found to be 18.3. The standard deviation was equal to approximately 3.68 or 3.7. The score of 18.3 indicated that 73.2% of the answers were answered correctly.

Each item on the "Questionnaire Test" as shown in Table VII, was found to be statistically significant at the .01 level of confidence.

Particular weaknesses in counselor knowledge seemed evident in items 5, 6, 7, 14, 15, 18, 21, 23, 24, and 25.

Items 5, 6, and 7 all had a low percentage of the counselors answering correctly. This would seem to indicate that from 41 to 48 percent of the counselors did not know how automation and computers affected the labor market, employment rates, or job stability. These questions fall in category IV which has been previously defined. Counselors must know the answers to these questions and others before they can assist a student in choosing a particular job or work classification.

Items 14, 15, 18, 21, 23, 24, and 25 are also of significant importance to the counselor. These questions belong in category II. The familiarity of the counselor with the duties and qualifications of data processing occupations is extremely important in the counseling of prospective data processing employees. These questions were correctly answered by 32.8% to 67.2% of the total number of counselors. This means that from one-third to two-thirds of the counselors could not answer these questions. How would the counselor be able to answer a similar question raised by a student regarding this area? The counselor would be in a rather difficult situation because he could not answer correctly.

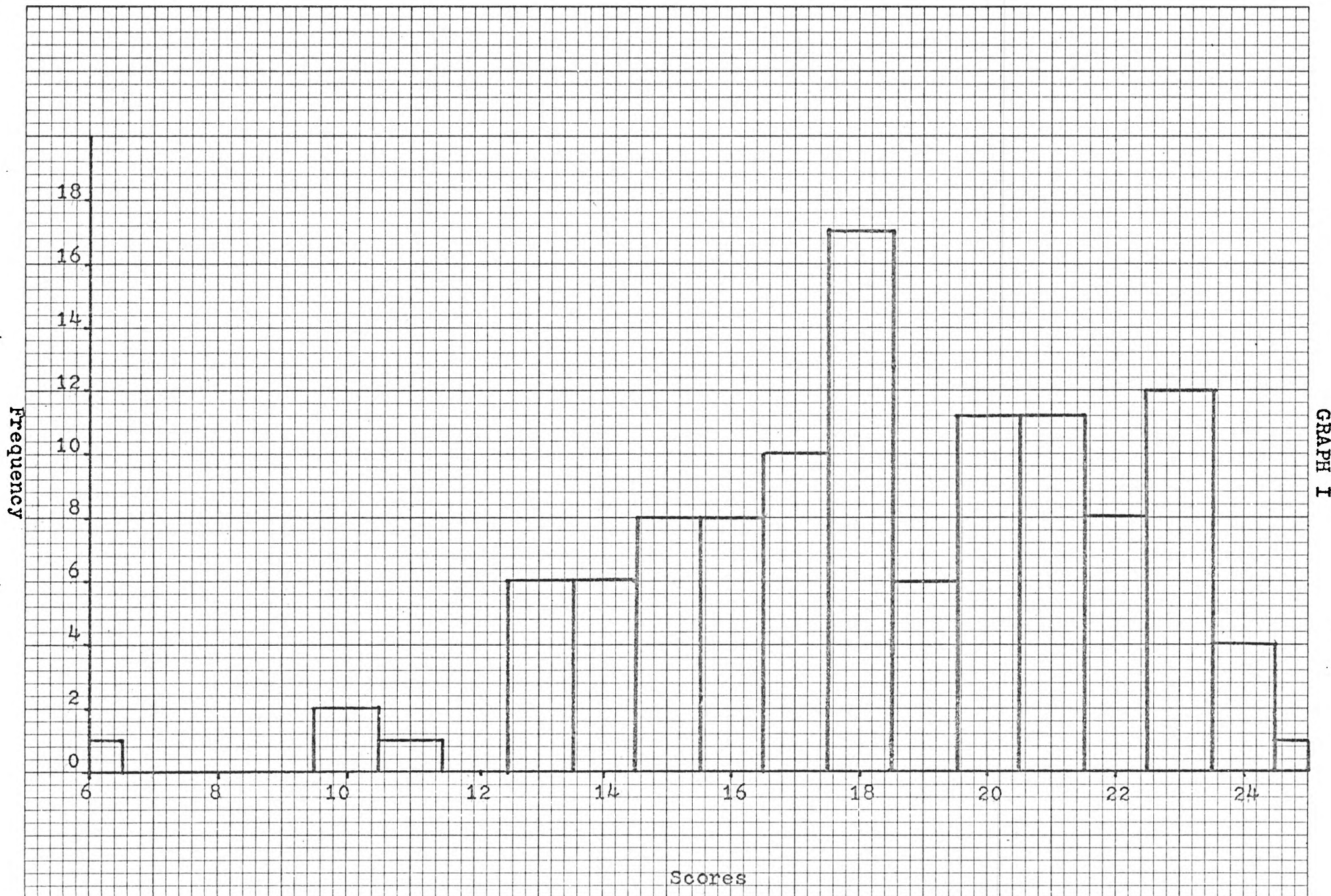
Item 25 had the lowest percentage of correct answers. This is interesting, because in this particular school system, there is a course offered in the operation of Unit Record equipment. The counselors for the most part do not know if this is a large scale computer system or not. This Unit Record equipment is a very small accounting machine and peripheral equipment. Training in this area would never be comparable to training on a large computer system.

Items 6 and 7 also fall in category III, which deals with the awareness of a changing world and living habits. These items received 59.2% and 52.1% correct answers. Job

classifications are constantly changing, and sometimes become obsolete. They are anything but stable. There seems to be a need for counselors to keep themselves updated in regard to these changes.

Counselors seem to recognize the use of computers for information retrieval and data analysis of testing information. Item 1 belongs to category I. Counselors should be shown how to best adapt their problems to computer applications.

In general, it was found that counselor knowledge was weakest in the area of data processing occupations. It is highly recommended that counselors receive training in this area as soon as deemed feasible by the school administrators.



GRAPH I

## CHAPTER V

### SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

#### Summary

The purpose of this study was to analyze responses on a "Questionnaire Test" which was sent to junior and senior high school counselors in a large city school system. Answers were sought to such questions as: Do counselors realize how useful computers can be in scoring, evaluating, and analyzing the multitudinous data with which every counselor must deal? Are counselors familiar with the various occupations in electronic data processing? How proficient is the counselor in explaining the duties and job qualifications of a data processing occupation? Could a counselor tell a student exactly what a systems analyst or a programmer actually does in his job? Could a counselor furnish a student with good, valid information about the data processing industry itself? How aware is the counselor of changes in the work world, job classifications, and their relationship to automation and its effects? How effectively can the counselor guide a student without the counselor's having a formidable knowledge of the labor market and the creation or obsolescence of jobs?

The sample group for this study consisted of 113 counselors in a school system in a large city in the South. The counselors were actively engaged in counseling from September, 1965, to June, 1966. The school district had a total of over 220,000 students, of which approximately 45,000 were in junior high schools, and 34,330 were in senior high schools.

The "Questionnaire Test" used in the analysis consisted of twenty-five items which required a true or false response. The twenty-five questions were assigned to the following categories:

- I. The recognition of computers by counselors for information retrieval and data analysis of counselor testing information.
- II. The familiarity of counselors with the duties and qualifications of occupations in electronic data processing.
- III. Counselor awareness of changing world and living habits.
- IV. Counselor knowledge of the labor market, job obsolescence, employment rates, and job stability.

The total score and item analysis of the "Questionnaire Test" consisted of determining the relationships between counselor responses and the actual correct responses. The significance of the results were discussed in relation to various tables and summary sheets.

### Conclusions

In general, it was found that every item on the "Questionnaire Test" was statistically significant at the .01 level of confidence.

Ten items had percentages of sixty-seven percent or less. These items fell in categories II, III, and IV.

Category II contained some of the lowest percentages. The familiarity of the counselor with the duties and qualifications of data processing occupations is of extreme importance in the counseling of prospective data processors.

Category III dealt with counselor awareness of a changing work world. Job classifications are constantly changing, and sometimes become obsolete. There is a need for counselors to keep abreast of the changes in the world of work.

Counselors did not seem to realize how automation and computers affected the labor market, employment rates, or job stability. This information is essential in the guidance of a student choosing a vocation.

The item with the lowest percentage of correct answers was item 25. The school system used in this study teaches the operation of Unit Record equipment in a two-year vocational data processing program. Only



32.8% of the counselors knew that Unit Record equipment was not a large scale computer system! When observed with this fact in mind, the lack of knowledge and understanding seems unforgivable.

In general, it was found that counselor knowledge was weakest in the area of data processing occupations. It was highly recommended that these counselors receive training in this area as soon as possible.

#### Recommendations

As stated previously, it is recommended that counselors, guidance instructors or administrative personnel set up local norms for their particular school population.

How can a counselor better acquaint himself with data processing occupations? It is easier than it may seem. Major computer companies have been quite cooperative with educational administrators in setting up programs to help counselors and interested teachers learn about automation and data processing. Counselors are able to talk to systems analysts and others in the field who can explain their duties, as well as furnishing other information about computer operations. Counselors should try to make these contacts in industry, as these furnish a good first hand report

of what is expected in certain occupations. Industry is quite interested in building an alliance with education, because until the present, industry has had to train its own workers. This has been a tremendous responsibility and burden, technically as well as financially. If education is to assume training, the schools must work closely with business to assure a program of success. The program must meet the needs of industry. Who can predict what industry needs any better than industry itself?

Another problem encountered in counseling is the ability of the counselor to predict which jobs will become obsolete in a few years due to new innovations brought about by automation and technological change. This is another new facet of his job which has been a product of automation. The counselor's role is changing also. The counselor must be able to accept change just as his counselees must accept it.

There will be thousands of new jobs which will be developed. They are beyond our comprehension now, but in reality they are just a few years away. The new fields which will develop constitute a challenge for the counselor. A counselor, of course, cannot be expected to be a psychic, but he must prepare himself for his new life. A counselor

should be able to foresee the change being wrought by automation, and he must be able to assist his students in accepting the changes which are inevitable in our civilization.

In addition to the above recommendations, the author has discovered other items which should be included in a revision of the "Questionnaire Test." It is recommended that the "Questionnaire Test" should consist of fewer questions. An additional part of the questionnaire might include multiple choice questions about the counselor personally such as:

1. Years Teaching Experience

- a. 1-3
- b. 4-6
- c. 7-10
- d. 11-15
- e. 16 and above

2. Years Counseling Experience

- a. 1-3
- b. 4-6
- c. 7-10
- d. 11-15
- e. 16 and above

3. Your Sex

- a. male
- b. female

4. Your Age Range

- a. 20-30 years
- b. 31-40 years
- c. 41-50 years
- d. 51 years and above

5. Are you a counselor in:

- a. Junior High School
- b. Senior High School
- c. Other

6. Have you ever attended a seminar or class in electronic data processing?

- a. yes
- b. no

The responses to these questions, as well as the responses to the true-false questions about data processing, lend themselves beautifully to computer analysis. The responses can be classified within different groups such as experience, age range, sex, junior or senior high counseling, and others.

It is the intent of the author to prepare a revised questionnaire incorporating the multiple choice questions and administer it again to the same sample group. The results can be easily punched into 80-column cards, and a program can be written for the desired analysis of the data. The program cards and the data cards will then be fed into the computer. This program will serve as an excellent example of the application of counseling techniques to electronic data processing.

It is further recommended that administrators arrange for seminars, lectures, and other educational programs to help their counselors attain a better understanding of automation and electronic data processing.

A seminar could easily be set up with the help of a local computer manufacturer's education center. IBM, Univac, Honeywell, NCR, and Monroe are a few of the manufacturers who have their own trained educational personnel. These people are usually available for teaching customers and for addressing various groups of interested citizens.

If the school district has a curriculum program in electronic data processing, the instructor for this program would be an ideal speaker for an electronic data processing training program for counselors.

It is the hope of the author that this study will stimulate interest and enthusiasm for automation and data processing among counselors.

There is such a need for enlightened counseling with respect to this field that we can ignore no longer the implications for counseling that automation is thrusting upon us.

Electronic data processing is the ground work of the future. It represents the beginning of a new age, and we

must prepare our youngsters so they will be able to utilize their knowledge to the best of their capabilities.

Our civilization is changing and we must be flexible enough to change with it. Although we may hold onto old ideas to stabilize ourselves, we must accept new ideas and formulate new concepts of thinking in order to propel this country and its people to new heights of wisdom and understanding.

Electronic data processing is the tool which we must use to accomplish our purpose. It is up to the educators of our nation to use this tool to inspire and instill in our youth a hunger for knowledge that will never be satisfied.

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