A Study of Aptitudes and Achievement of Students Confined at the Utah State Industrial School for the Purpose of Determining Occupational Aptitude Patterns to be Used as Guidelines for Formulating a Vocational Education Curriculum

James R. Heggen

Follow this and additional works at: https://digitalcommons.usu.edu/etd

Part of the Education Commons

Recommended Citation
Heggen, James R., "A Study of Aptitudes and Achievement of Students Confined at the Utah State Industrial School for the Purpose of Determining Occupational Aptitude Patterns to be Used as Guidelines for Formulating a Vocational Education Curriculum" (1968). All Graduate Theses and Dissertations. 2887. https://digitalcommons.usu.edu/etd/2887

This Dissertation is brought to you for free and open access by the Graduate Studies at DigitalCommons@USU. It has been accepted for inclusion in All Graduate Theses and Dissertations by an authorized administrator of DigitalCommons@USU. For more information, please contact digitalcommons@usu.edu.
A STUDY OF APTITUDES AND ACHIEVEMENT OF STUDENTS CONFINED AT THE
UTAH STATE INDUSTRIAL SCHOOL FOR THE PURPOSE OF DETERMINING
OCUPATIONAL APTITUDE PATTERNS TO BE USED AS GUIDELINES
FOR FORMULATING A VOCATIONAL EDUCATION CURRICULUM
by
James R. Heggen

A dissertation submitted in partial fulfillment
of the requirements for the degree
of
DOCTOR OF EDUCATION
in
Industrial Education

UTAH STATE UNIVERSITY
Logan, Utah
1968
# TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>Chapter</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>I. THE PROBLEM</strong></td>
<td>1</td>
</tr>
<tr>
<td>Introduction</td>
<td>1</td>
</tr>
<tr>
<td>Need for the Study</td>
<td>3</td>
</tr>
<tr>
<td>Statement of the Problem</td>
<td>6</td>
</tr>
<tr>
<td>Purpose of the Study</td>
<td>7</td>
</tr>
<tr>
<td>Background</td>
<td>8</td>
</tr>
<tr>
<td>Definition of Terms</td>
<td>13</td>
</tr>
<tr>
<td><strong>II. REVIEW OF LITERATURE</strong></td>
<td>16</td>
</tr>
<tr>
<td><strong>III. RESEARCH PROCEDURES</strong></td>
<td>24</td>
</tr>
<tr>
<td>Introduction</td>
<td>24</td>
</tr>
<tr>
<td>Sample Description</td>
<td>24</td>
</tr>
<tr>
<td>Instrumentation</td>
<td>27</td>
</tr>
<tr>
<td>Wechsler Intelligence Scale for Children (WISC)</td>
<td>27</td>
</tr>
<tr>
<td>General Aptitude Test Battery (GATB)</td>
<td>30</td>
</tr>
<tr>
<td>California Achievement Test (CAT)</td>
<td>36</td>
</tr>
<tr>
<td>Statistical Procedure</td>
<td>38</td>
</tr>
<tr>
<td>Difference between means</td>
<td>40</td>
</tr>
<tr>
<td>Correlations</td>
<td>41</td>
</tr>
<tr>
<td>Occupational Aptitude Patterns</td>
<td>41</td>
</tr>
<tr>
<td>Limitations of Study</td>
<td>43</td>
</tr>
<tr>
<td><strong>IV. PRESENTATION OF DATA</strong></td>
<td>45</td>
</tr>
<tr>
<td>Question 1</td>
<td>45</td>
</tr>
<tr>
<td>Summary</td>
<td>54</td>
</tr>
<tr>
<td>Question 2</td>
<td>55</td>
</tr>
<tr>
<td>Summary</td>
<td>62</td>
</tr>
<tr>
<td>Question 3</td>
<td>64</td>
</tr>
<tr>
<td>Summary</td>
<td>69</td>
</tr>
<tr>
<td>Question 4</td>
<td>69</td>
</tr>
<tr>
<td>Summary</td>
<td>76</td>
</tr>
</tbody>
</table>
# TABLE OF CONTENTS (Continued)

<table>
<thead>
<tr>
<th>Chapter</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Question 5</td>
<td>78</td>
</tr>
<tr>
<td>Summary</td>
<td>83</td>
</tr>
<tr>
<td>Question 6</td>
<td>84</td>
</tr>
<tr>
<td>Summary</td>
<td>94</td>
</tr>
<tr>
<td><strong>V. SUMMARY, CONCLUSIONS AND RECOMMENDATIONS</strong></td>
<td>96</td>
</tr>
<tr>
<td>Summary</td>
<td>96</td>
</tr>
<tr>
<td>Conclusions</td>
<td>98</td>
</tr>
<tr>
<td>Recommendations</td>
<td>99</td>
</tr>
<tr>
<td>Summary</td>
<td>102</td>
</tr>
<tr>
<td><strong>LITERATURE CITED</strong></td>
<td>103</td>
</tr>
<tr>
<td><strong>APPENDIXES</strong></td>
<td>106</td>
</tr>
<tr>
<td>Appendix A. Utah State Industrial School (Study by Dr. Sowles)</td>
<td>107</td>
</tr>
<tr>
<td>Appendix B. Percentile Equivalents of Aptitude or Standard Scores</td>
<td>108</td>
</tr>
<tr>
<td>Appendix C. Manual for the GATB, Section II</td>
<td>109</td>
</tr>
<tr>
<td><strong>VITA</strong></td>
<td>110</td>
</tr>
<tr>
<td>Table</td>
<td>Description</td>
</tr>
<tr>
<td>-------</td>
<td>-------------</td>
</tr>
<tr>
<td>1.</td>
<td>Total sample comparison to WISC norms established by Sowles</td>
</tr>
<tr>
<td>2.</td>
<td>Total group aptitude scores compared to the GATB norms</td>
</tr>
<tr>
<td>3.</td>
<td>Group 1 (males confined once) aptitudes compared to GATB norms</td>
</tr>
<tr>
<td>4.</td>
<td>Group 2 (males confined twice or more) aptitudes compared to GATB norms</td>
</tr>
<tr>
<td>5.</td>
<td>Group 3 (females confined once) aptitudes compared to GATB norms</td>
</tr>
<tr>
<td>6.</td>
<td>Group 4 (females confined twice or more) aptitudes compared to GATB norms</td>
</tr>
<tr>
<td>7.</td>
<td>Total group achievement level compared to CAT norms</td>
</tr>
<tr>
<td>8.</td>
<td>Group 1 (males confined once) achievement levels compared to CAT norms</td>
</tr>
<tr>
<td>9.</td>
<td>Group 2 (males confined twice or more) achievement levels compared to CAT norms</td>
</tr>
<tr>
<td>10.</td>
<td>Group 3 (females confined once) achievement levels compared to CAT norms</td>
</tr>
<tr>
<td>11.</td>
<td>Group 4 (females confined twice or more) achievement levels compared to CAT norms</td>
</tr>
<tr>
<td>12.</td>
<td>Composite sub-group aptitude scores on the GATB</td>
</tr>
<tr>
<td>13.</td>
<td>Comparison of aptitude differences between sub-groups on the GATB</td>
</tr>
<tr>
<td>14.</td>
<td>Composite sub-group comparisons in achievement levels</td>
</tr>
<tr>
<td>15.</td>
<td>Number and percentage of students qualifying for each of the 36 Occupational Aptitude Patterns</td>
</tr>
<tr>
<td>16.</td>
<td>Comparison of Occupational Aptitude Patterns by groups and percentages</td>
</tr>
<tr>
<td>17.</td>
<td>Total group product-moment correlation matrix between variables</td>
</tr>
</tbody>
</table>
**TABLE OF FIGURES**

<table>
<thead>
<tr>
<th>Figure</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Comparison of group aptitude mean scores on the General Aptitude Test Battery</td>
<td>56</td>
</tr>
<tr>
<td>2. Amount of group retardation on the California Achievement Test</td>
<td>63</td>
</tr>
</tbody>
</table>
ABSTRACT

A Study of Aptitudes and Achievement of Students Confined at the Utah State Industrial School for the Purpose of Determining Occupational Aptitude Patterns to be Used as Guidelines for Formulating a Vocational Education Curriculum

by

James R. Heggen, Doctor of Education

Utah State University, 1968

Major Professor: Dr. Austin Loveless
Department: Industrial and Technical Education

Aptitude and achievement data of students detained at the Utah State Industrial School were studied in order to establish occupational aptitude patterns to serve as guidelines in the formation of a vocational educational curriculum at the institution.

Based on scores attained on the California Achievement test, the total group sample was found to be retarded 3.7 years in achievement level, compared to norms established by this instrument. Based on the scores attained on the General Aptitude Test Battery, the total group sample was found to be significantly below the norms established by this instrument in aptitudes relating to intelligence, verbal, numerical, and clerical perception, and above average norms in manual dexterity and form perception.

Occupational aptitude patterns were established from the General Aptitude Test Battery, and it was determined that 60 percent of the student sample group could qualify for seven of these occupational aptitude patterns.
Based on established occupational aptitude patterns and other extenuating factors, the type of vocational education curriculum which was suggested for the Utah State Industrial School was a general vocational curriculum with stress on vocational guidance and a well defined work experience program.

(117 pages)
A vital characteristic of the democratic way of life is the belief in the dignity of every individual. In order to implement this belief, the United States has long been committed to an educational philosophy which aims at effectively providing maximum development of the potential of every individual.

Benjamin C. Willis, writing in the American Vocational Journal, made this observation, which seems to sum up the educational expectations:

When we attempt to describe quality in education, we are attempting to describe effective education. Scholarship and appropriateness of content in relation to the existing society and to the individual are both prerequisite to this effectiveness. (Willis, 1963, p. 19)

Certainly an important part of developing the potential of every individual through education is providing each student with the essentials necessary to effectively compete in the existing labor market.

This goal becomes more meaningful when we consider the type of labor market young people today will face. Dr. Francis Gregory of the Manpower Development and Training Division of the United States Department of Labor has described the labor situation as follows: "There will be no increase in the demand for unskilled labor. Therefore, young persons reaching the age of employment without a marketable skill are headed for trouble" (Gregory, 1963, p. 29).
The fact that our educational system has a long way to go in achieving its goal of providing effective education for employment was illustrated in 1965, when despite available jobs and available workers, there was still a total of 2.9 million workers unemployed, a vast number of whom were young persons joining the labor market for the first time.

Because individual well-being and national prosperity go hand in hand, these problems of unemployment have a great effect on this nation's economy. "In 1965, for example, the gap between actual and potential employment represented a loss of almost 7 million in gross national product" (Unused Manpower, 1966, p. 3). Obviously during a period when the demand for manpower is increasing, as it did in 1966, the full utilization of the nation's manpower resources becomes of great importance.

In addition to the economic harm to our country, unemployment and underemployment cause more far-reaching problems. Specifically related to this research is the relationship between unemployment and juvenile delinquency. Fleisher notes the following relationship: "An examination of delinquency rates and other variables by age and through time suggests that the effect of unemployment on juvenile delinquency is positive and significant" (Fleisher, 1963, p. 553). This fact becomes even more evident when we consider the attitude these particular young people have toward employment. Silverstein explains this attitude in the following terms:

Often the delinquent or predelinquent adolescent has his academic limitations pointed out to him over and over in the school situation . . . Consequently, securing some form of work becomes the most appropriate, desirable alternative for avoiding frustration and achieving status. (Silverstein, 1965, p. 225)
Obviously these young people perceive employment of vital importance as it gives them an opportunity to be independent and relatively free from adult control.

When searching for solutions to the problem of unemployment among juvenile delinquents, of greatest importance is the relationship between unemployment and education. This fact would seem to be illustrated by the following evidence. "The lack of training and skilled work experience has been characterized as the real barrier to employment for delinquents, rather than a criminal record" (Manpower Research Bulletin, 1966, p. 9).

Considered in these terms, the problem would seem to have a fairly clear-cut solution. Juvenile delinquents will have to be prepared mentally and physically for a fast-changing, complex world of work if they are to successfully compete in the job market. This preparation involves developing new attitudes and marketable skills, which can only be achieved through education.

Under normal circumstances, the public school system assumes the responsibility of providing an education appropriate to the interests and abilities of all students; however, students who are confined to correctional institutions fall outside this structured program. Therefore, the need arises for studying the educational problems of students confined to corrective institutions.

Need for the Study

The state of Utah is faced with a growing problem of unemployment of young people and at the same time with an increase of juvenile
delinquency. In 1960, the census bureau reported there were 41.7 thousand young people in the state between the ages of 14 and 19, and by 1970 there will be 68.7 thousand in this same age group. Based on projected increases in juvenile delinquency in this age group, related to the increased population, problems of delinquency are destined to increase.

With the realization that the problem will become greater, there can be little doubt that a need exists to study education among these institutionalized juvenile delinquents, as the problems these particular young people face related to employment are usually far greater than those of an average group of young people.

Because these students, for the most part, do not return to school, they are forced to obtain some type of employment when they are released. It should be noted that because the majority of delinquents come from the half million youths, 14 through 19 years old, who have dropped out of school, the employment picture is not bright for them.

In general, the unemployment rate for high school dropouts is much higher, their earnings are considerably lower, and their opportunities are much more limited than for young people in good standing in the community, who have received their high school diplomas. For the most part, these problems are caused by their lack of education and skills as well as their ignorance of the job market.

The problem, therefore, facing those individuals and agencies who are responsible for providing assistance to juvenile delinquents is perplexing. Delinquent youth have a strong interest in and definite need for employment; yet they are most ill-equipped for any type of work. In addition, they have little knowledge of the job demands,
they are not familiar with the qualifications required to obtain certain jobs, and their vocational desires are unrealistic due to their lack of skill, training, and poor insight into their own capacities.

Educators and public officials have long recognized the problems involved in providing an appropriate curriculum for students in corrective institutions. Kemp indicated the importance of the problem in these terms:

We can no longer ignore the rise of juvenile delinquency. Young people learning nothing, going nowhere, with no skill with which to claim a job, with no one to care what happens to them, and with no road to opportunity, are a rebuke to the inadequacy of our educational system. (Kemp, 1966, p. ii)

Recently, however, as the numbers of delinquents continue to grow, new attempts are being made to provide some effective solutions to the problems involving lack of training and the institutionalized juvenile delinquent.

With the passage of the Vocational Educational Act of 1963 came new impetus for these programs as great stress is being placed on implementing or up-grading vocational educational curriculums. However, many times there is a tendency to inaugurate these new programs without thoroughly investigating the aptitudes and achievements of the students who will utilize these new curriculums.

A Panel of Consultants on Vocational Education indicated that "Students should be selected for specific education programs only when their aptitudes, interests, and achievements indicate they will be able to attain the required occupational skill." (Bishop and Tolley, 1963, p. 227)
Therefore, this study will attempt to present and analyze aptitude and achievement data of juvenile delinquents for the purpose of formulating an effective vocational education curriculum.

Statement of the Problem

Juvenile delinquents are institutionalized in Utah at the Utah State Industrial School. This institution is located in Ogden, Utah, and serves the entire state. The students in this institution are considered delinquent and have been placed there by court order. The student population is approximately 350 to 400 with an age range from 10 to 18 years, with the ratio being two-thirds male and one-third female.

Generally speaking, in structure and population, the assumption has been made that the Utah State Industrial School is similar to other industrial schools in the United States. Therefore, the analysis of student data could be applicable to similar educational institutions in the nation.

The school has a well-defined academic curriculum, which includes regular academic classes and instruction which is geared to the academically retarded. However, at the present time there is a very limited vocational education curriculum.

The Utah State Industrial School is currently considering expanding its vocational curriculum. A comprehensive study of all factors which would justify this new vocational curriculum has been undertaken by the Research Coordinating Unit of the State of Utah, and as a part of the general study, this particular research is undertaken.
Therefore, it is the purpose of this research to provide a study of aptitudes and achievement of students confined at the Utah State Industrial School for the purpose of determining occupational aptitude patterns to be used as guidelines for formulating a vocational education curriculum.

**Purpose of the Study**

The purpose of this study is to collect and analyze aptitude and achievement data of students detained at the Utah State Industrial School, to establish occupational aptitude patterns to serve as guidelines in the formation of a vocational education curriculum at the institution.

To establish occupational aptitude patterns as a guideline for a vocational education curriculum this study will attempt to answer the following questions:

1. What are the differences between the aptitudes of students aged 15.5 to 18.5 confined to the Utah State Industrial School and the norms established by the General Aptitude Test Battery?

2. What are the differences between the achievement levels of students aged 15.5 to 18.5 confined to the Utah State Industrial School and the norms established by the California Achievement Test?

3. What are the differences between the aptitudes and achievement of students aged 15.5 to 18.5 who have been confined to the institution only once as compared to those who have been confined to the institution more than once?

4. Which occupational aptitude patterns are most prevalent among the 15.5 to 18.5 year old students confined to the Utah State Industrial School?
5. Can the California Achievement Test and the General Aptitude Test Battery be used as measures of aptitudes and achievement of students aged 15.5 to 18.5 who are confined to the Utah State Industrial School?

6. Based on established occupational aptitude patterns, what type of vocational educational curriculum would best meet the needs of the students confined at the Utah State Industrial School?

Background

Before presenting an analysis of the data relating to aptitudes and achievement of students confined to the Utah State Industrial School for the purpose of formulating guidelines for a vocational education curriculum, it is important to understand the nature of vocational education in order to determine whether such education would be meaningful when related to the data.

Vocational education curriculums, as they exist today, are of relatively recent origin, but the philosophy involved is as old as civilization. This philosophy holds that man is capable of improving his general standard of living by learning to work more effectively.

By definition, vocational education is:

... education designed to develop skills, abilities, understandings, attitudes, work habits and appreciation encompassing knowledge and information needed by workers to enter and make progress in employment on a useful and productive basis. It is an integral part of the total educational program and contributes toward the development of good citizens by developing their physical, social, civic, cultural and economic competencies. (Committee on Research and Publications of the American Vocational Association, 1954, p. 12)

Although differences have arisen in vocational education relating to methods of implementing programs, most vocational educators would
agree that the ultimate goals are concerned with learning to work. Of great importance, however, is the fact that the method used to implement this goal has a significant bearing on the degree of efficiency achieved.

Most programs of vocational education which attempt to prepare youth for employment can be identified by two broad approaches: (1) general preparation for employment; and (2) occupational training. Essentially the difference between the two approaches is a difference based on purpose.

Benjamin and others describe the general preparation as follows:

General preparation for employment describes an approach that seems to rest on the assumption that unemployment inheres in the youth themselves. They are viewed as being unable to perform well on a job--any job--because of poor work habits and attitudes, limited ability, and unrealistic notions about themselves and their vocational goals. They need help, according to this view, to improve their attitudes, give them greater self-awareness, and acquire some of the fundamentals for getting a job. Programs of this type may be called by various names; they are, however, more alike than different since they all offer general rather than specific job preparation. (Benjamin, Lesh, Freedman, 1965, p. 11)

Educators who favor this type of program contend that a general or fundamental course is, in the long run, the best preparation for a vocation.

Those educators who adhere to the occupational approach to vocational education insist that the general courses serve a purpose but do not provide the specific competencies needed in preparing youth to compete in the labor market today.

The following explanation indicates their position:

When a program reflects the occupational training approach, the chief assumption is that the problem of unemployable youth stems more from external economic conditions, particularly
changing employment patterns, than from the nature of the youth themselves. There is little or no demand for unskilled youth, and, in fact, there are only certain occupations untrained youth can expect to enter; this is largely what makes them unemployable. A youth employment program especially designed for the least employable, according to this view, must consider the employment outlook and train youth specifically for those occupations where employment is possible. (Benjamin, Lesh, Freedman, 1965, p. 12)

In summary, the general vocational education program has as its basic goal to provide youth with a good vocational understanding so that he will understand the world of work. In this program it is assumed that he needs only the most elementary type of skills, which he can acquire in a short time. However, in the vocational occupational education program, job orientation and training for specific occupations are of prime importance because entry skills are considered a necessity in the labor market.

The element that both approaches usually have in common is some work experience in the vocational education process. In the general vocational education program, this work experience is usually used only as a guidance tool or is combined with guidance on equal footing. It serves to improve attitudes, motivation, and behavior. However, vocational education programs which stress occupational training use work as on-the-job training to teach specific skills, not to gain an understanding of the world of work.

Of importance to this study of aptitudes and achievement of juvenile delinquents are general assumptions relating to future employment of youth involved in such programs. It is assumed by most vocational educators that students involved in the general preparation area will be basically low-skilled workers, usually to be employed in the service trades. In the occupational training programs it has been assumed that
the majority of students are semi-skilled and will be employed in manufacturing as well as in service trades. This fact is of particular interest to this study in that many vocational educators believe that to master the skills and training necessary for today's occupations, youth must possess the same degree of ability and work habits as students doing college preparatory work (Benjamin, Lesh, Freedman, 1965).

Obviously there are problems in the preparation of youth for employment regardless of which approach is selected. Assuming that the general preparation programs can succeed in preparing all-around workers through better work habits and attitudes and a better understanding of the work world, they could still fall short of their goal if the students who complete these programs cannot find work for lack of an entry skill. Assuming, however, that the occupational vocational program can provide a specific skill for the student, what assurance is there that specific skills acquired will match those required when training is completed? If we cannot accurately predict which occupations will employ these students, the programs will also fall short of established goals.

Although it would appear that an easy solution to this problem could be obtained by soliciting employers' reactions to programs of vocational training, this has not proven to be an effective guide. Employer attitudes on this matter cannot be clearly established. Many indicate that they prefer a higher level of general vocational training to be used as a good foundation for on-the-job training, while others prefer a greater emphasis on specific occupational training (Getting Hired, Getting Trained, 1965). Of some help, however, was research
conducted on this topic indicating that employers' opinions on the subject seemed to vary from industry to industry, with the large employers preferring the well-trained generalist and the small employers hoping to be able to obtain specific occupational skills (Getting Hired, Getting Trained, 1965).

Added to these facts, the results of an employer attitude survey in three labor market areas (Hartford, Connecticut; Winston Salem, North Carolina; and Charlotte, North Carolina) would seem to reiterate the general confusion related to vocational training programs. About 50 percent of the employers suggested occupational training as improving the school's preparation of youth, but indicated that they felt that the problems of youth were more closely associated with behavior and motivation than with pre-employment preparation. Responses on youth were far more frequently focused on attitude (51 percent) than on the desirability of training (31 percent) (Getting Hired, Getting Trained, 1965).

It should be obvious, therefore, why it was felt necessary to examine the background of vocational education before presenting the data. The problems involved in attempting to formulate any program of vocational education are significant, but these problems will become even more meaningful when the aptitudes and achievement data gathered from juvenile delinquents are analyzed.

One thing is clear, however, relating to vocational education programs in public schools, as well as those specifically formulated for institutionalized youth. As citizens, young people are entitled to an education which is appropriate for their aptitudes and achievement
levels. In vocational education, as in all education, the great concern is quality in relation to the potential of the individual and the needs of society.

**Definition of Terms**

For the purpose of this research study, the following definitions of terms have been employed. Unless otherwise indicated, the definitions are those of the American Vocational Association.

**Advisory Committee.** A group of persons, usually outside the educational profession, selected for the purpose of offering advice and counsel to the school regarding the vocational program. Members are representatives of the people who are interested in the activities with which the vocational program is concerned (American Vocational Association, 1962, p. 3).

**Cooperative Education.** A program for persons who are enrolled in a school and who, through a cooperative arrangement between the school and employers, receive part-time vocational instruction in the school and on-the-job training through part-time employment. It provides for alternation of study in school with a job in industry, or business, the two experiences being planned and supervised by school and employer so that each contributes definitely to the student's development in his chosen occupation (American Vocational Association, 1962, p. 6).

**Curriculum.** The series of courses designed to cover the instruction in a designated field. It may refer also to the whole body of courses offered in an educational institution (American Vocational Association, 1962, p. 7).
**Exploratory Courses.** School subjects designed to provide the student with a broad, general, over-all view of the knowledge and skills involved in a field of learning or an occupation. Courses which provide students with exploratory and introductory experiences in a wide range of occupations serve as an aid in choosing a vocation (American Vocational Association, 1962, p. 8).

**Guidance, Vocational.** The process of assisting individuals to understand their capabilities and interests, to choose a suitable vocation, and to prepare for, enter, and make successful progress in it (American Vocational Association, 1962, p. 10).

**Industrial Education.** A generic term applying to all types of education related to industry including industrial arts education, vocational industrial education (trade and industrial education), and much technical education (American Vocational Association, 1962, p. 11).

**Manpower Development and Training Act.** A federal act administered by the Department of Labor and the Department of Health, Education, and Welfare. Its function is the training of the unemployed and underemployed as well as the retraining of persons who are displaced due to automation and technological changes (American Vocational Association, 1962, p. 13).

**Juvenile Delinquency.** Delinquency is a legal term, a finding by a court, generally as a result of the child's violation of a law. The term is not diagnostic and is not sufficient to classify the child (Institutions Serving Delinquent Children-Guides and Goals, 1954, p. 3).

**Work Study Program.** An employment program administered by the local educational agency and made reasonably available (to the extent of available funds) to all eligible youths in the area served by such
agency or some other public agency or institution and will be furnished only to students who (a) have been accepted for enrollment as full-time students in an approved vocational education program, (b) need earnings to continue their vocational education, and (c) are at least 15 and less than 21 years of age. (American Vocational Association, 1962, p. 23).
CHAPTER II  
REVIEW OF LITERATURE

Almost all literature today related to the need for vocational education in corrective institutions indicates that the need for such education is of primary importance if rehabilitation of juvenile delinquents is to become a reality. Obviously, the problem becomes even more significant when related to the increase in juvenile delinquency which is taking place today in every section of the country. In spite of the urgency with which most educators seem to regard vocational education for delinquents, most corrective institutions have been slow to implement new programs, and among the reasons most often cited for failure to provide this training is a lack of meaningful research in the area.

In 1964, the Secretary of Labor conducted a study of correctional inmates and, as a result of the study, called for a comprehensive program of vocational guidance, remedial education, skill training, and job referral for those incarcerated in corrective institutions (Manpower Report of the President, 1966).

In spite of this mandate and the growth of the problem, little research was forthcoming.

Again in 1966, the Department of Labor called for research in this area by indicating that the potential contribution of vocational training as a means of reducing returnees and preparing parolees to assume a productive status in society should be more fully tested and
explored in correctional institutions. This Labor Department study indicated that many releasees who return to society as poorly equipped and trained, with no vocational skills, as when they entered correctional institutions could not be expected to improve on their pattern of insecure employment and low wages which are associated with unskilled jobs (Manpower Research Bulletin, 1966).

Further evidence of the government's concern for the problem can be illustrated, according to Prigmoie and others, by the record: "Recent laws passed by Congress reveal a recognition of the importance of vocational rehabilitation of offenders and the need for expanded research into improving the training programs for correctional workers" (Prigmoie and others, 1965, p. 37). An example of such legislation is the Correctional Rehabilitation Study Act.

Although it would seem that with the federal government leading the way much research into the area of education in corrective institutions would be undertaken, such has not been the case.

Glaser describes this situation in the following terms:

While research is worthwhile in any school, it is not always as essential as it is in prison schools. Most schools can learn the answers to their questions by studying the published reports of research done elsewhere, in schools or with pupils comparable to theirs. In correctional education there is not enough research literature available to meet the needs of prison schools. In addition, each correctional system has unique features in sentencing and parole policies, and in the communities it serves, which make some of the knowledge it needs apply only to it. (Glaser, 1966, p. 8)

In order to begin to establish the effectiveness of vocational education programs, an examination was made of these programs in general. One such study of high school graduates with vocational training was conducted by Coe. This study was made 10 years after
graduation and the former students indicated that the vocational training was of great help to them in their employment. From the standpoint of vocational education, the findings of this study can be interpreted as really successful as most working graduates (61%) were still employed in occupations for which they were trained and they had a favorable reaction to the training even after a ten-year period. (Coe, 1965).

While there does seem to be ample research evidence to indicate that vocational education is desirable and practical for those outside of correctional institutions, there is also some research available to illustrate the need for it in such institutions. Lightfoote, in a study aimed at developing a plan for vocational training at the Alabama Industrial School, concluded that institutionalized students do need to be trained in a trade or vocation with which to earn a living when they are released (Lightfoote, 1961).

Probably the most meaningful study in this specific area was reported by Sard. Since 1964, at Lorton Youth Center, a penal institution in the District of Columbia, 195 young men sentenced under the Federal Youth Corrections Act have received training in a contract project under the Manpower Development and Training Act. The program has achieved great success. Of 89 parolees, after 18 months, all but 2 had obtained employment, and of these, 77 were placed in fields for which they were trained. Of greatest importance, however, is the fact that there was only a 4.5 percent return rate, as compared with a return rate of 46.9 percent over the same period for parolees who had not received
such training. Two other programs similar to this are now being con-

The Rikers Island study specifically trained young inmates to
operate data processing machines in a two-month period, and the pre-
liminary findings of this research project indicated that most of the
trainees were capable of absorbing the training even though they were
school dropouts and that youthful inmates can be given meaningful

LaVallee reported another study involving vocational education at
Auburn Prison, Auburn, New York, and concluded that although follow-ups
with released parolees are not easy to obtain, many instructors fre-
quently receive letters of appreciation from parolees for helping them
to find employment upon release. The institution also receives many
inquiries from employers in the area relative to the availability of
trained men (LaVallee, 1966).

It should also be pointed out that in response to the Labor
Department's urgent request for research and testing in the area of
vocational education for correctional institutions, many important
research projects are currently underway. In the Preston School of
Industry in California, there is a continuing project to train delin-
quents with low academic achievement and poor employment potential by
giving work habits training and vocational counseling (Seckel and
Fuller, 1966). The extent of this problem in California, for example,
is clearly illustrated by Kemph:

The California Department of Corrections and the Paroles
Division is facing a trend toward a highly competitive labor
market in the placement of inmates. From now until 1970, the
Department will make its contribution to the California work
force by releasing 45 to 50 thousand inmates to compete for
To meet the challenge, Correctional Industries and Education must commit more of their resources to the education of inmates and the improvement of the quality and quantity of on-the-job training and technical instruction. Opportunities for both academic and vocational education must be provided, and the two programs must be better coordinated. (Kemph, 1965, p. 13)

Among other projects currently in effect are Operation G.R.O.W.T.H., Group Rehabilitation Orientation and Work Training Help, in Colorado and a similar study in Oklahoma, through the Oklahoma State Department of Education.

Of great importance to this study is the research already undertaken to indicate "why" vocational education is of such vital importance to youth in correctional institutions.

The first reason why this training is important can be readily understood from a study completed in 1966 under the direction of the Office of Manpower. From this study it was determined that all things being equal, releasees who have received training or education during their correctional period are more employable in the labor force (Powell, 1966). This employability factor becomes more significant when combined with the results of study by Jacks which found that during a given period of time, July 1 to December 31, 1964, and based on cases released on parole by the Pennsylvania Board of Parole, two-thirds of the persons involved in crime were unemployed when the crime was committed (Jacks, 1966).

Based on this philosophy of lack of training being directly related to unemployment and unemployment being directly related to crime, the United States Office of Manpower Policy has funded a current study titled Project D.E.V.E.L.O.P., Developing Educational-Vocational
Experiences for Long Term Occupational Adjustment of Parolees. Witt has this to say about this project:

There is support for the notion that success on parole is closely related to job adjustment. Therefore, a promising approach to the task of assisting large numbers of offenders to readjust favorably in society would be an action program which helps them to secure suitable employment and encourage them to develop the knowledge, skills and attitudes essential for becoming established in the world of work. (Witt, 1966)

All research seems to indicate that any releasee who is not capable of supporting himself can certainly easily become subject to pressures which quickly may lead again to crime and a return to prison. One comprehensive study of paralee earnings in the State of Virginia over a twelve-year period, as related to parole violations, showed a direct relationship between low earnings and high parole violations. For example, more than 40 percent of the releasees with a monthly income of less than $50 violated parole in some way, as compared to only 10 percent of the releasees with an income of $275 per month who violated parole (Manpower Research Bulletin, 1966).

Although not directly related to other studies already mentioned, there are three more studies which should be cited in that they could have a direct bearing on either the procedures or curriculum recommendations resulting from this research. The first of these studies was conducted by Conanway and concluded that the rehabilitation division of correctional institutions should utilize material concerning intelligence and occupational aptitudes when developing a training program for the inmates (Conanway, 1961). The testing of institutionalized youths as a preliminary step for planning vocational curriculum, as described in the next chapter, was an attempt to meet this criteria.
The last two studies cited will provide some background for the type of curriculum recommendations resulting from this research. One of these studies by Siegel, Richlin, and Federman relates to an evaluation of general training programs versus the specialized instructional program and concludes that although in some areas there was no statistically significant between-group differences in performance, in other areas the more generally trained group was superior to a statistically significant extent. (Siegel, Richlin, Federman, 1960).

A final related study was reported by Super and concerns vocational choice decisions made by youths in the age bracket involved in this study. He has written:

The second problem is the nature of exploratory vocational behavior. This particular term came to be used in work on the Career Pattern Study, which was concerned with what high school boys do that brings about increased vocational maturity and leads to the making of prevocational and vocational choices. The Career Pattern Study analysis of vocational maturity in early adolescence having shown that most boys are ready to explore themselves and the world of work with a view to eventual occupational choice, but are not ready to make such choices, we considered it crucial to analyze the exploratory process during the high school years. (Super, 1962, p. 13)

In summary, it may be said that the following generalizations have been derived from a review of available literature in the area of vocational education for correctional institutions.

1. The United States Government is well aware of the many problems which exist in this area and has taken steps to correct these problems by passing legislation relating to the problem and encouraging research and testing.

2. This research is of great importance to correctional institutions as each institution is usually unique.
3. Studies have indicated that vocational training was considered valuable by graduates not only immediately upon entering the work world, but for as long as 10 years later.

4. Studies have proven that vocational training is possible and has many positive effects in corrective institutions.

5. Many meaningful studies are currently underway in this area.

6. Institutionalized youths who have been exposed to vocational training do become more employable.

7. There is a direct relationship between employment and crime and employment and the number of releasees who return to institutions.

8. There is evidence to indicate that in some areas general training is more effective in the long run than specialized training.

9. Before planning a vocational curriculum, intelligence and occupational aptitudes of those to be trained should be investigated.

10. Boys of high school age are not ready to make occupational choices, but are interested in an exploratory vocational program.
CHAPTER III
RESEARCH PROCEDURES

Introduction

According to Borg (1963, p. 136), "A fundamental purpose of research is to make inferences about the characteristics of population by studying the characteristics of samples of these populations." It must be recognized that research findings relate to groups and describe average group tendencies but that there is always individual variability to consider and special planning is still required for work with individuals. Therefore, when considering the results of research procedures, it is important not to confuse statistical significance with practical significance.

Sample Description

The over-all student population of youths confined at the Utah State Industrial School is approximately 375 to 400 students. The age range is from 10 to 21 years, with one-third of the population being girls and two-thirds boys. The students are about two-thirds Caucasians, and the remaining one-third is made up of Negroes, Indians, and Spanish-Americans. Students are usually confined for an unlimited duration; however, the average length of confinement is about nine months. The return rate of released students at this institution has been approximately 40 percent over a period of years.
The student population for this particular study was selected on the assumption that only those in the age range of 15.5 to 18.5 years would be able to benefit from a vocational education program. This premise was based on general occupational requirements that a youth needs to be a certain age in order to secure employment.

The original sample utilized in this research was anticipated at being approximately 200 students. However, because the student population is in a continued state of flux, the finalized total number was 169 students. Specific reasons for this reduced final population number are as follows:

1. Some of the students were released from school prior to completing all of the required tests.

2. Some of the students worked or attended school off the campus and were not available for testing.

3. Some of the students were confined to maximum security and could not be tested.

4. Some of the students are either mentally retarded or illiterate.

5. Some of the students refused to participate in the testing.

The 169 students who completed all of the tests represent the maximum available number of youths who met the age criteria of 15.5 to 18.5 years who are confined at the Utah State Industrial School.

The sample group was further divided by two criteria: (1) sex and (2) number of times confined. This last division divided them into those confined either once or any other number of times. This division of the sample group was as follows:
Group 1--69 males confined once
Group 2--45 males confined twice or more
Group 3--39 females confined once
Group 4--17 females confined twice or more

The average age of the sample was 16 years, 9 months. The average age of each of the sub-groups was as follows:

Group 1--males confined once--16 years, 7 months
Group 2--males confined twice or more--16 years, 6 months
Group 3--females confined once--16 years, 10 months
Group 4--females confined twice or more--17 years, 2 months

The sample ratio of two-thirds males and one-third females is approximately the same as the ratio of the total confined population. The number of youths utilized in the sample group in the confined twice or more group is approximately 40 percent, the same percentage as in the total confined population at the Institution.

In order to establish the stability of the sample as being representative of the normal school population at the Utah State Industrial School, a comparison was made between the scores obtained on the Wechsler Intelligence Scale for Children from the sample and the scores obtained from an eleven-year (1955-1966) study of intelligence of the school's population by Sowles (Appendix A).

A comparison of the mean scores obtained from the two groups indicates that there was no large degree of difference between them. The small amount of variance could probably be accounted for by the fact that the criteria established for the current research sample tended to eliminate a small portion of the total school population.
Table 1. Total sample comparison to WISC norms established by Sowles

<table>
<thead>
<tr>
<th></th>
<th>Sample mean</th>
<th>Sowles mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Full-Scale</td>
<td>95.80</td>
<td>92.80</td>
</tr>
<tr>
<td>Verbal-Scale</td>
<td>93.16</td>
<td>89.16</td>
</tr>
<tr>
<td>Performance-Scale</td>
<td>96.59</td>
<td>97.62</td>
</tr>
</tbody>
</table>

**Instrumentation**

The three instruments used in this study were designed to gather data that relate to intelligence, achievement, and aptitudes.

Two of the tests, intelligence (Wechsler Intelligence Scale for Children) and achievement (California Achievement Test), were administered to the students upon their confinement to the school. These two tests are used to identify the abilities of the students in order to properly place them in a grade level in school.

The third test, aptitude (General Aptitude Test Battery), was given to approximately 135 of the sample in May, 1967. The other portion of the sample had taken the General Aptitude Test Battery prior to this testing time.

**Wechsler Intelligence Scale for Children (WISC)**

The basic reason for selecting the Wechsler Intelligence Scale for Children to evaluate the intelligence of students confined at the Utah State Industrial School was that these students are generally academically retarded. The Wechsler Intelligence Scale for Children has grown out
of the familiar Wechsler-Bellevue Intelligence Scale and was best suited for youths up to the age of 16.

The purpose of reporting on the scores of the Wechsler Intelligence Scale for Children in this study was to verify the stability of the sample group used in this research as compared to a ten-year study of intelligence done by Sowles (1967). The Sowles study evaluated student intelligence at the Utah State Industrial School for an eleven-year period, 1955-1966 (Appendix A).

It should be noted that a small portion of the students at the Utah State Industrial School had been given the Wechsler Adult Intelligence Scale; however, since the percentage was very small and the correlation between the Wechsler Intelligence Scale for Children and the Wechsler Adult Intelligence Scale was very high, the latter test was disregarded in this study.

Parts of the test

The Wechsler Intelligence Scale for Children consists of 12 individual tests of intelligence which yield three composite scores. However, only 10 of the 12 tests are usually given in order to determine the intelligence quotient. If fewer or more tests are used, a prorated statistical interpretation must be made.

The Verbal Score of the Wechsler Intelligence Scale for Children is based on 5 tests: (1) general information, (2) general comprehension, (3) arithmetic, (4) similarities, and (5) vocabulary (unless prorated).

The Performance Score of the Wechsler Intelligence Scale for Children is derived from 5 tests: (1) picture completion, (2) picture arrangement, (3) block design, (4) object arrangement, and (5) coding or mazes.
The Full-Scale Score of the Wechsler Intelligence Scale for Children is the combined sum of the 10 scores of the verbal and performance scores (Wechsler, 1949).

Reliability

The reliability of the Wechsler Intelligence Scale for Children was derived from three age groups, 7.5, 10.5, and 13.5. These groups were considered to be the most representative of the various age ranges. The coefficient correlations for the 7.5 age group range from .59 for comprehension to .84 for block design. For the age 10.5 group the coefficient correlations range from .59 for digit span to .91 for vocabulary. In the 13.5 age group the coefficient correlations range from .68 for picture completion to .90 for vocabulary. The verbal coefficient correlations range from .88 for the 7.5 age group to .96 for the other two groups. The performance score ranges from .86 to .90 and the full-scale score from .92 to .95.

Validity

The validity of the Wechsler Intelligence Scale for Children was established on a total of 2,200 cases of equal numbers of boys and girls. The sample was selected according to the United States census of 1940. This sample group was selected on the basis of three factors: (1) the four geographical areas in the United States, (2) the urban-rural proportions and (3) parental occupations.

The inter-correlations of the 12 tests in the Wechsler Intelligence Scale for Children for age groups were corrected for contamination by using McNemar's formula. This correction of the coefficients of
correlation resulted in obtaining correlations that ranged from .38 between verbal and object assembly to .83 for full-scale to vocabulary for the 10.5 age group (Wechsler, 1949).

**General Aptitude Test Battery (GATB)**

Since 1945 the General Aptitude Test Battery, form B-1002, has been used by the United States Employment Service for measuring the aptitudes of persons seeking employment. This test is a separate answer form and measures both intelligence and manual manipulative skills.

The test consists of 12 separate tests which yield 9 composite aptitude scores. Of the 12 tests, 8 are paper-pencil tests and 4 are apparatus tests. The apparatus tests involve the use of the United States Employment Service peg boards for parts 9 and 10 and the finger dexterity boards for parts 11 and 12.

**Description of Tests in the GATB (B-1002)**

**Part 1 - Name Comparison.** This test consists of two columns of names. The examinee inspects each pair of names, one in each column, and indicates whether the names are the same or different. Measures Clerical Perception.

**Part 2 - Computation.** This test consists of a number of arithmetic exercises requiring the addition, subtraction, multiplication, or division of whole numbers. Measures Numerical Aptitude.

**Part 3 - Three-Dimensional Space.** This test consists of a series of exercises containing a stimulus figure and four drawings of three-dimensional objects. The stimulus figure is pictured as a flat piece of metal which is to be either bent or rolled or both. Lines indicate where the stimulus figure is to be bent. The examinee indicates which one of the four drawings of three-dimensional objects can be made from the stimulus figure. Measures Intelligence and Spatial Aptitude.

**Part 4 - Vocabulary.** This test consists of sets of four words. The examinee indicates which two words have either the same or opposite meaning. Measures Intelligence and Verbal Aptitude.
Part 5 - Tool Matching. This test consists of a series of exercises containing a stimulus drawing and four black-and-white drawings is the same as the stimulus drawing. Variations exist only in the distribution of black to white in each drawing. Measures Form Perception.

Part 6 - Arithmetic Reason. This test consists of a number of arithmetic problems expressed verbally. Measures Intelligence and Numerical Aptitude.

Part 7 - Form Matching. This test consists of two groups of variously shaped line drawings. The examinee indicates which figure in the second group is exactly the same size and shape as each figure in the first or stimulus group. Measures Form Perception.

Part 8 - Mark Making. This test consists of a series of squares in which the examinee is to make three pencil marks, working as rapidly as possible. The marks to be made are short lines, two vertical and the third horizontal line beneath them. Measures Motor Coordination.

Part 9 - Place. The equipment used for this test and for Part 10 consists of a rectangular wooden board (Pegboard) divided into two sections, each containing 48 cylindrical wooden pegs. The upper section contains 48 cylindrical wooden pegs. The examinee removes the wooden pegs from the holes in the upper part of the board and inserts them in the corresponding holes in the lower part of the board, moving two pegs simultaneously, one in each hand. This performance is done three times, with the examinee working rapidly to move as many of the pegs as possible during the time allowed for each of three trials. Measures Manual Dexterity.

Part 10 - Turn. The equipment described under Part 9 is also used for this test. For Part 10 the lower section of the board contains the 48 cylindrical pegs. The examinee removes a wooden peg from a hole, turns the peg over so that the opposite end is up, and returns the peg to the hole from which it was taken, using only his preferred hand. The examinee works rapidly to turn and replace as many of the 48 cylindrical pegs as possible during the time allowed. Three trials are given for this performance. Measures Manual Dexterity.

Part 11 - Assemble. The equipment used for this test and for Part 12 consists of a small rectangular board (Finger Dexterity Board) containing 50 holes and a supply of small metal rivets and washers. The examinee takes a small metal rivet from a hole in the upper part of the board with his preferred hand and at the same time removes a small metal washer from a vertical rod with the other hand; examinee puts the washer on the rivet and inserts
the assembled piece into the corresponding hole in the lower part of the board using only his preferred hand. The examinee works rapidly to move and replace as many rivets and washers as possible during the time allowed. Measures Finger Dexterity.

Part 12 - Disassemble. The equipment used for this test is the same as that described for Part 11. The examinee removes the small metal rivet of the assembly from a hole in the lower part of the board, slides the washer to the bottom of the board, puts the washer on the rod with one hand the rivet into the corresponding hole in the upper part of the board with the other (preferred) hand. The examinee works rapidly to move and replace as many rivets and washers as possible during the time allowed. Measures Finger Dexterity. (Guide to the Use of the GATB, 1962, pp. 13-14)

Aptitudes Measured in the GATB

Throughout the remainder of this study the aptitudes measured by the General Aptitude Test Battery will be referred to with the letter listed in the following section. The nine aptitudes measured by B-1002 are defined below. The letter used as the symbol to identify each aptitude precedes each aptitude name. The part or parts of the General Aptitude Test Battery measuring each aptitude follows the definition.

Aptitude G - Intelligence. General learning ability. The ability to "catch on" or understand instructions and underlying principles; the ability to reason and make judgments. Closely related to doing well in school. Measured by Parts 3, 4, and 6.

Aptitude V - Verbal Aptitude. The ability to understand meaning of words and to use them effectively. The ability to comprehend language, to understand relationships between words and to understand meanings of whole sentences and paragraphs. Measured by Part 4.

Aptitude N - Numerical Aptitude. Ability to perform arithmetic operations quickly and accurately. Measured by Parts 2 and 6.

Aptitude S - Spatial Aptitude. Ability to think visually of geometric forms and to comprehend the two-dimensional representation of three-dimensional objects. The ability to recognize the relationships resulting from the movement of objects in space. Measured by Part 3.
Aptitude P - Form Perception. Ability to perceive pertinent detail in objects or in pictorial or graphic material. Ability to make visual comparisons and discriminations and see slight differences in shapes and shadings of figures of figures and widths and lengths of lines. Measured by Parts 5 and 7.

Aptitude Q - Clerical Perception. Ability to perceive pertinent detail in verbal or tabular material. Ability to observe differences in copy, to proofread words and numbers, and to avoid perceptual errors in arithmetic computation. Measured by Part 1.

Aptitude K - Motor Coordination. Ability to coordinate eyes and hands or fingers rapidly and accurately in making precise movements with speed. Ability to make a movement response accurately and swiftly. Measured by Part 8.

Aptitude F - Finger Dexterity. Ability to move the fingers and manipulate small objects with the fingers, rapidly and accurately. Measured by Parts 11 and 12.


GATB Norms

The working population norms of the General Aptitude Test Battery were established in 1952 on the basis of a selected stratified sample of 4,000 workers. The sample was obtained in proportion to the occupations of the total general working population.

The norms established for each of the nine different aptitudes was a mean score of 100 with a standard deviation of 20. The intercorrelations of the test range from .78 for factors G and V to .03 for factors V and M. The median correlation for the inter-correlation scores was .29 (GATB, Section III, 1962, p. 30).

Validity of Norms

The validity of the test battery was determined by a correlation coefficient between the established norms and the designated criterion.
This criterion was established through a job analysis and supervisory rating. The tetrachoric correlation coefficient was used to determine the relationship between the two factors. The tetrachoric coefficient was not regarded as significant unless it was at least twice its standard error. However, in more recent studies using the GATB, the phi coefficient is being used to substantiate the validity of the norms.

A study involving students in grade 12 to substantiate the concurrent validity of the General Aptitude Test Battery as it relates to over-all high school success shows a .01 significance level to all factors (GATB, Section III, 1962, p. 178).

Reliability

The reliability of the General Aptitude Test Battery has been proven in two different ways. One was stability, which involves a correlation coefficient between the initial test and retest scores on the same test form; the second measure of reliability was equivalence, which was a correlation coefficient between scores on different forms of the same test.

The coefficient of stability ranges from .65 for the F factor to .85 for factor V (GATB, Section III, 1962, p. 147).

The coefficient of equivalence ranges from .71 for factor Q to .83 for factor G for females (GATB, Section III, 1962, p. 153).

Identification of Occupational Aptitude Patterns

Contained in the General Aptitude Test Battery Manual, Section II, 1966, is identification of Occupational Aptitude Patterns, which have been established based on General Aptitude Test Battery norms. Within
Each Occupational Aptitude Pattern level are a series of occupations requiring certain aptitudes. "Each Occupational Aptitude Pattern consists of the most significant aptitudes and the cutting scores on these aptitudes established as minimum scores for the family or groups of occupations having similar aptitude requirements" (GATB, Section III, 1962, p. 101). The Occupational Aptitude Patterns are established on a multiple cutting score. Each pattern utilizes three of the aptitude scores which are the most significant factors for the occupations within the particular occupation aptitude pattern. The multiple-cutting score makes it feasible to identify those patterns in which the student has some occupational possibilities.

Presently there are 36 Occupational Aptitude Patterns with 753 occupations. The occupational titles and codes for the 753 occupations are identified by the Dictionary of Occupational Titles. Of interest to this research was the fact that Occupational Aptitude Patterns have been established for the General Aptitude Test Battery for the ninth and tenth grade students since they have not reached aptitude maturity.

The Occupational Aptitude Patterns were established in the following way. A number of groups of occupations for which aptitude requirements were essentially the same were established. This was accomplished by selecting occupations for which norms had been developed and placing them in groups as follows:

1. An occupation which had three aptitudes in its specific norms was grouped with other occupations that had norms with the same three aptitudes in common.

2. An occupation with specific norms which included four or more aptitudes was placed in each group of occupations with specific norms which had any three of these aptitudes in common.
3. An occupation which had only two aptitudes in its specific norms was experimentally placed in each of the above groups of occupations with norms that included both of these aptitudes. (GATB, Section III, 1962, pp. 101-102)

It should be stressed that as research indicates a need, the data for each new test development study are analyzed to determine whether existing norms or occupational aptitude patterns need revision.

Bechtoldt (1957) in reviewing the General Aptitude Test Battery concludes that the tests are well constructed and seem to be more complete than any other test battery available. Carroll summarizes his review of the test battery as follows:

The fact that nearly all of these coefficients are in the range of .80 to .90 speaks well for the measurement characteristics of the tests (for factors V, S, Q, K). In particular, they need to give attention to the problems of identifying the skills of the workers technologically unemployed by automation. (Carroll, 1957)

California Achievement Test (CAT)

The California Achievement Test was given to all youths before placement in the Utah State Industrial School. These are a series of comprehensive tests designed for a three-fold purpose: (1) facilitating evaluation, (2) educational measurement, and (3) diagnosis.

These achievement tests are developed for grade 1 to grade 14. These test used in this study was the Junior High Level, grades 7, 8, and 9, forms X and Y. The test used was based on the 1963 norms.

The test is divided into six major parts, which yield three composite scores for reading, arithmetic, and language. The test also yields a total battery score.
Parts of the Test

Test 1 - Reading Vocabulary is designed to measure the students' ability to select a word in a given series that has the same meaning as the key word.

Test 2 - Reading Comprehension is designed to measure the students' ability to comprehend the material he reads.

Test 3 - Mathematical Reasoning measures the functional abilities of the student.

Test 4 - Mathematics Fundamentals is divided into the four major parts of mathematics: addition, subtraction, division, and multiplication.

Test 5 - Mechanics of English is divided into three sections: capitalization, punctuation, and word usage.

Test 6 - Spelling consists of 30 sets of 4 words which require the student to determine whether any are misspelled. (Tiegs and Clark, 1963, p. 67)

Reliability

The reliability of the California Achievement Test was established by using the Kuder-Richardson formula 21 on each of the six parts of the test. The reliability coefficient correlation ranges from .83 for spelling to .94 for mathematics in the individual tests. The correlation for the four major composite scores range from .93 for language to .98 for the total battery. The error of measurement for grade placement in the eighth grades vary from .07 to .2. Therefore, the standard error in grade placement indicates that for reading vocabulary 0.6 there was a two to one chance that true grade placement will not vary more than six months. In other terms, based on the test, the possibility that true grade placement would vary more than 12 months would be a nineteen to one chance (Tiegs and Clark, 1963).
Validity

The validity of the California Achievement Test was established by the discrimination power of each item. The procedure involves subtracting the percentage of correct responses of the bottom twenty-seven percent of the examinees from the percentage of correct responses of the top twenty-seven percent. The range of items that have a phi coefficient of less than .20 is as follows: (1) Reading 7%, (2) Arithmetic 8%, and (3) Mechanics of English 1%. The justification for the inclusion of these items in the tests is based on two factors:

1. Some of the items were retained because of their value to the school's curriculum.

2. Some of the items were extremely easy or extremely difficult; therefore, it is very difficult to obtain a high degree of discriminating power. (Tiegs and Clark, 1963)

North reviewed the California Achievement Test in the following terms:

The California Achievement Test is suitable for use by schools who want to focus their achievement measurements and diagnosis on the traditional, fundamental skills and content in the areas of reading, arithmetic, and English. (North, 1957, p. 3)

Statistical Procedure

The cumulative records of students aged 15.5 to 18.5 years, who were confined at the Utah State Industrial School on April 1, 1967, were investigated to determine the following information:

1. Name
2. Age
3. Sex
4. Number of times confined
5. Score on General Aptitude Test Battery (Aptitudes)
6. Score on California Achievement Test (Achievement)
7. Score on Wechsler Intelligence Scale for Children (Intelligence)

In order to establish a description of the various groups and sub-groups, each of the factors was analyzed in the following manner:

1. Based on the General Aptitude Test Battery, the California Achievement Test, and the Wechsler Intelligence Scale for Children, the mean and standard deviation were determined for each of the following:
   (a) Entire student group, aged 15.5 to 18.5 years
   (b) Male group, aged 15.5 to 18.5 years (confined once)
   (c) Male group, aged 15.5 to 18.5 years (confined twice or more)
   (d) Female group, aged 15.5 to 18.5 years (confined once)
   (e) Female group, aged 15.5 to 18.5 years (confined twice or more)

2. The significant differences between the means at the .05 and .01 levels were determined for:
   (a) Entire group versus the national norms
   (b) Each sub-group versus the national norms

3. Correlation matrix between the variables of the aptitude (GATB) and achievement (CAT) tests was constructed.

4. The total number of students and numbers by sub-groups, who obtained the minimum score for each of the 36 Occupational Aptitude Patterns (GATB) were identified.

In general terms, the statistical design of this study was based on the following three-fold purpose:

1. To determine the differences between the various groups.
2. To discover the relationships between various factors of the administered tests.
3. To establish the numbers of students who qualify for each of the 36 Occupational Aptitude Patterns.

**Difference between means**

To determine whether there was any differences between the various groups, the significant difference between two uncorrelated means was used. This analysis was based on Garrett's formula 56b (Garrett, 1965, p. 214). The differences were computed for the whole group versus the national norms and between each of the sub-groups and the national norms.

**Formula 56b:**

\[
\sigma_D = \sqrt{\frac{\sigma_1^2}{N_1} + \frac{\sigma_2^2}{N_2}}
\]

\(\sigma_1 = \text{S.D. of } M_1\)

\(\sigma_2 = \text{S.D. of } M_2\)

\(N_1 \text{ & } N_2 = \text{Sample Sizes}\)

\(\sigma_D = \text{S.E. of differences between the two samples}\)

Once the standard error of the difference was found, the critical-ratio test was used to determine the degree of significance. Garrett's formula for critical ratio was used (Garrett, 1965, p. 215).

**Critical Ratio Test:**

\[
\text{C.R.} = \frac{(M_1 - M_2) - 0}{\sigma_D} = \frac{D}{\sigma_D}
\]

\(M_1 = \text{Mean of Sample 1}\)

\(M_2 = \text{Mean of Sample 2}\)

\(0 = \text{Assumed Deviation from Mean}\)

\(\sigma_D = \text{S.E. of Difference between the two Samples}\)

\(D = \text{Difference between the two Sample Means is taken from } .00 \text{ in terms of } \sigma_D\)
The assumption was made that the statistical procedure used was a two-tailed test of significance, in that the difference between the obtained means could be either plus or minus.

The levels of confidence were established at .05 and .01 and the critical-ratio was established according to Table D (Garrett, 1965, p. 449), depending on the various size of the samples.

**Correlations**

A linear correlation was used to establish the product-moment coefficient of correlation which illustrates the relationship between the variables. A perfect relationship would be expressed as a coefficient of +1.00 and no relationship expressed as .00. Thus, a score falling between these two limits always implies some degree of positive association, depending on the size of the coefficient. The relationship may also be expressed with a negative association, indicating an inverse association (Garrett, 1965).

The product-moment coefficient of correlation was illustrated in a matrix system which shows the relationship between each of the variables with all of the other variables. This matrix was constructed only for the total group and was corrected for errors by pooling the correlations for each of the four sub-groups.

**Occupational Aptitude Patterns**

The aptitude scores obtained from the General Aptitude Test Battery for the entire group was separated into two categories (those students aged 15.5 to 16.5 years and 16 years, 7 months to 18.5 years). The reason for this was that students in the first group were assumed not
to have reached aptitude maturity. Therefore, their aptitude scores (first group) were converted to twelfth grade aptitude scores.

The conversion of the tenth grade norms to twelfth grade norms was arrived at as follows:

1. The obtained aptitude scores for the tenth grade was converted to a percentile score (Table in Appendix B).

2. These percentile scores were converted to twelfth grade aptitude scores using the table shown in Appendix C.

The obtained aptitude scores were then used in order to determine the numbers of students who qualified for each of the 36 Occupational Aptitude Patterns. These Occupational Aptitude Patterns were established in the General Aptitude Test Battery Manual, Section II, Norms, June 1966.

The qualifying students were identified by each of the four sub-groups and as a total group. The obtained numbers of students within each group and each Occupational Aptitude Pattern were then converted to a percentage (Percentile Score).

The comparison of each group, in order to determine whether there was any significant difference, was accomplished using Garrett's formula 64 for uncorrelated percentages (Garrett, 1965, p. 235).
Formula 64:

\[ \sigma_{D^2} = \sqrt{PQ \left[ \frac{1}{N_1} + \frac{1}{N_2} \right]} \]

\[ p = \frac{N_1 P_1 + N_2 P_2}{N_1 + N_2} \]

\( N_1 \) & \( N_2 \) = Sample size

\( P_1 \) & \( P_2 \) = Percentage of sample size

\( Q = 1 - P \)

\( \sigma_{D^2} = \text{S.E. of difference between the two percentages} \)

The levels of confidence were established at the .05 and .01 level and the critical ratio was established according to Table D (Garrett, 1965, p. 449), depending on the various size of the sample.

The critical ratio test (Garrett, 1965, p. 236) was used to determine the degree of significance between the percentages.

Critical Ratio Test:

\[ \text{C.R.} = \frac{(P_1 - P_2) - 0}{\sigma_{D^2}} \]

\( P_1 \) = Percentage of sample 1

\( P_2 \) = Percentage of sample 2

\( 0 \) = Assumed deviation from mean percentage

\( \sigma_{D^2} \) = S.E. of difference between the two percentages

Limitations of Study

The study was based on the following limitations:

1. The sample group consists of available students who were confined at the Utah State Industrial School on April 1, 1967.
2. Factors which might have affected performance of students on the tests, such as previous schooling or work experience, were not considered.

3. The population samples in the four different sub-groups contain a variety of numbers, and some sub-groups are fairly small.

4. Only those students between the ages of 15 years, 6 months and 18 years, 6 months were given the General Aptitude Test Battery.

5. No attempt was made to differentiate between ethnic groups.
To clarify data related to testing the questions which were posed in the first chapter, each question was considered in the same order and form.

To facilitate presenting the data, a table or figure was used to describe the research results in each area. The particular findings mentioned were those in some way significant, rather than discussing every entry in the table or figure whether significant or not.

Before presenting the data the sample groups will again be identified for clarification:

- Total Group -- 169 students tested
- Group 1 -- 69 males confined once
- Group 2 -- 45 males confined twice or more
- Group 3 -- 39 females confined once
- Group 4 -- 17 females confined twice or more

**Question 1**

What are the differences between the aptitudes of students aged 15.5 to 18.5 confined to the Utah State Industrial School and the norms established by the General Aptitude Test Battery?

To answer this question, the significant difference between the mean scores of the total sample on each aptitude and the mean scores
identified by the General Aptitude Test Battery were used to establish differences between the confined group and the national norms.

The norms for the General Aptitude Test Battery were based on a working population of 4,000 samples, and each aptitude norm has a mean score of 100 with a standard deviation of 20.

The data in Table 2 illustrate the comparison of the total sample of 169 student mean scores and standard deviations of the nine aptitude scores, as related to the national mean scores and standard deviations. This comparison was used to determine the differences and the level of confidence of these differences.

From the data in Table 2 it can be seen that the aptitudes G (Intelligence), V (Verbal), and N (Numerical), and Q (Clerical Perception) were significantly different at the .01 level of confidence. Since these mean score variations were below the established national mean score norms of 100, it was assumed that on these aptitudes the total group was significantly below normal.

Since aptitudes G, V, and N relate to intelligence, learning situations requiring the utilization of these aptitudes would have to be geared to these limitations.

In addition to those aptitudes related to intelligence, G, V, and N, which were significant at the .01 level, and below the national mean score, aptitude Q (Clerical Perception) was also significant at the .01 level, and below the national mean score of 100. This difference between the mean score of the sample group and the national norm indicates that the total group sample was slightly handicapped in terms of clerical learning situations. The standard deviation of 12.45 was
Table 2. Total group aptitude scores compared to the GATB norms

<table>
<thead>
<tr>
<th>GATB aptitudes</th>
<th>GATB mean</th>
<th>Total group mean</th>
<th>Difference between mean</th>
<th>Total group S.D.</th>
<th>Critical ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>G - Intelligence</td>
<td>100</td>
<td>89.71</td>
<td>10.31</td>
<td>16.53</td>
<td>5.59**</td>
</tr>
<tr>
<td>V - Verbal Aptitude</td>
<td>100</td>
<td>87.82</td>
<td>12.18</td>
<td>13.79</td>
<td>8.29**</td>
</tr>
<tr>
<td>N - Numerical Aptitude</td>
<td>100</td>
<td>89.51</td>
<td>10.49</td>
<td>18.25</td>
<td>7.34**</td>
</tr>
<tr>
<td>S - Spatial Aptitude</td>
<td>100</td>
<td>101.12</td>
<td>1.12</td>
<td>18.48</td>
<td>.77</td>
</tr>
<tr>
<td>P - Form Perception</td>
<td>100</td>
<td>103.17</td>
<td>3.17</td>
<td>18.49</td>
<td>2.17*</td>
</tr>
<tr>
<td>Q - Clerical Perception</td>
<td>100</td>
<td>95.96</td>
<td>4.04</td>
<td>12.45</td>
<td>4.00**</td>
</tr>
<tr>
<td>K - Motor Coordination</td>
<td>100</td>
<td>100.56</td>
<td>.56</td>
<td>20.85</td>
<td>.34</td>
</tr>
<tr>
<td>F - Finger Dexterity</td>
<td>100</td>
<td>100.07</td>
<td>.07</td>
<td>26.87</td>
<td>.03</td>
</tr>
<tr>
<td>M - Manual Dexterity</td>
<td>100</td>
<td>109.51</td>
<td>9.51</td>
<td>24.87</td>
<td>4.90*</td>
</tr>
</tbody>
</table>

*Significant at the .05 level of confidence (1.97 Critical-Ratio is required for significance at the .05 level).

**Significant at the .01 level of confidence (2.60 Critical-Ratio is required for significance at the .01 level).

7.55 below the national standard deviation of 20, which indicates that the differences within the group were not as great as could be expected in a normal group.

Aptitude M (Manual Dexterity) was also found to be significant at the .01 level of confidence. The mean score of 109.51 and the standard deviation of 24.87 were both above the established national norms.
Therefore, the total sample group has above average ability in manual dexterity and the group was found to be more widely separated in this aptitude than the national sample group.

Aptitude P (Form Perception) was found to be significant at the .05 level of confidence. The mean score of 103.17 shows that the total group was slightly above the average for this aptitude.

In order to complete the examination of the aptitudes of the sample group as compared to aptitude norms established by the General Aptitude Test Battery, a comparison was made between each of the sub-groups and the established national norms. This comparison of the sub-groups to the national norms illustrates differences within each sub-group which were not evident when these groups were combined in the large sample group.

The data presented in Table 3 illustrate the aptitude differences between males confined once and the aptitude norms established by the General Aptitude Test Battery.

Some of the aptitude differences of this sub-group were comparable with the results obtained by the total group sample. As in the total sample group comparison, aptitudes G (Intelligence), V (Verbal), N (Numerical), and Q (Clerical Perception) were significant at the .01 level. Aptitude M (Manual Dexterity) was also found to be significant at the .05 level.

However, for this sub-group one other aptitude, F (Finger Dexterity), emerged as being significant at the .05 level. The mean score of 93.09 for this aptitude was 6.91 below the national average. Therefore, when this sub-group is isolated from the total group sample, it is deficient
### Table 3. Group 1 (males confined once) aptitudes compared to GATB norms

<table>
<thead>
<tr>
<th>GATB aptitudes</th>
<th>GATB mean</th>
<th>Group 1 mean</th>
<th>Difference between mean</th>
<th>Group 1 S.D.</th>
<th>Critical ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>G - Intelligence</td>
<td>100</td>
<td>89.87</td>
<td>10.13</td>
<td>17.07</td>
<td>4.84**</td>
</tr>
<tr>
<td>V - Verbal Aptitude</td>
<td>100</td>
<td>87.69</td>
<td>12.31</td>
<td>14.28</td>
<td>7.03**</td>
</tr>
<tr>
<td>N - Numerical Aptitude</td>
<td>100</td>
<td>87.63</td>
<td>12.37</td>
<td>19.01</td>
<td>5.31**</td>
</tr>
<tr>
<td>S - Spatial Aptitude</td>
<td>100</td>
<td>101.03</td>
<td>1.03</td>
<td>18.66</td>
<td>.45</td>
</tr>
<tr>
<td>P - Form Perception</td>
<td>100</td>
<td>97.79</td>
<td>2.21</td>
<td>19.18</td>
<td>.94</td>
</tr>
<tr>
<td>Q - Clerical Perception</td>
<td>100</td>
<td>91.62</td>
<td>8.38</td>
<td>11.13</td>
<td>6.03**</td>
</tr>
<tr>
<td>K - Motor Coordination</td>
<td>100</td>
<td>95.57</td>
<td>4.43</td>
<td>21.67</td>
<td>1.67</td>
</tr>
<tr>
<td>F - Finger Dexterity</td>
<td>100</td>
<td>93.09</td>
<td>6.91</td>
<td>25.58</td>
<td>2.21*</td>
</tr>
<tr>
<td>M - Manual Dexterity</td>
<td>100</td>
<td>107.91</td>
<td>7.91</td>
<td>24.44</td>
<td>2.65*</td>
</tr>
</tbody>
</table>

*Significant at the .05 level of confidence (2.00 Critical-Ratio is required for significance at the .05 level).

**Significant at the .01 level of confidence (2.66 Critical Ratio is required for significance at the .01 level).

In five of the nine aptitudes, as opposed to four deficiencies for the entire sample group. In addition, the standard deviation of 25.58 for aptitude F (Finger Dexterity) indicates a wider range of abilities in this sub-group for this aptitude than for the national norm deviations.

The data presented in Table 4 illustrate the aptitude differences between males confined twice or more and the aptitude norms established by the General Aptitude Test Battery.
As in the total sample group comparison of aptitudes, aptitudes G (Intelligence), V (Verbal), N (Numerical), and Q (Clerical Perception) were significant at the .01 level. Aptitude M (Manual Dexterity) was found to be significant at the .05 level of confidence. The mean of 120.49 was 20.49 above the national average. This indicates that the group has extremely high ability in manual dexterity. Aptitude F
(Finger Dexterity) was also significant at the .05 level with a mean of 109.80 and a standard deviation of 24.77. Since both of these scores were above the national norms, the sub-group containing males who have been confined twice or more has better than average ability in finger dexterity. The deviation difference indicates that there was more variance in aptitude within the group than would be found in a normal sample.

The data in Table 5 illustrate the differences in aptitudes between females confined once and the national norms established by the General Aptitude Test Battery.

As in the total sample group comparison, aptitudes G (Intelligence), V (Verbal), and N (Numerical) were significant at the .01 level of confidence. However, aptitude Q (Clerical Perception) was not different from the average established norm, except that the standard deviation was below the average of 20, which would indicate that this sub-group of females does not deviate very much within the group.

Aptitude P (Form Perception) for this sample sub-group was significant at the .01 level, with a mean of 110.36 and a standard deviation of 17.16. Therefore, this sub-group has above average form perception, and the variance within the group was not as great as in an average group.
Table 5. Group 3 (females confined once) aptitudes compared to GATB norms

<table>
<thead>
<tr>
<th>GATB aptitudes</th>
<th>GATB mean</th>
<th>Group 3 mean</th>
<th>Difference between means</th>
<th>Group 3 S.D.</th>
<th>Critical ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>G - Intelligence</td>
<td>100</td>
<td>88.97</td>
<td>11.03</td>
<td>16.48</td>
<td>4.14**</td>
</tr>
<tr>
<td>V - Verbal</td>
<td>100</td>
<td>90.37</td>
<td>9.63</td>
<td>13.43</td>
<td>4.43**</td>
</tr>
<tr>
<td>N - Numerical</td>
<td>100</td>
<td>89.28</td>
<td>10.72</td>
<td>17.54</td>
<td>3.78**</td>
</tr>
<tr>
<td>S - Spatial</td>
<td>100</td>
<td>101.64</td>
<td>1.64</td>
<td>20.73</td>
<td>.49</td>
</tr>
<tr>
<td>P - Form</td>
<td>100</td>
<td>110.36</td>
<td>10.36</td>
<td>17.16</td>
<td>3.74**</td>
</tr>
<tr>
<td>Q - Clerical</td>
<td>100</td>
<td>103.26</td>
<td>3.26</td>
<td>13.76</td>
<td>1.46</td>
</tr>
<tr>
<td>K - Motor</td>
<td>100</td>
<td>102.52</td>
<td>2.52</td>
<td>14.13</td>
<td>1.10</td>
</tr>
<tr>
<td>F - Finger</td>
<td>100</td>
<td>98.54</td>
<td>1.46</td>
<td>27.33</td>
<td>.33</td>
</tr>
<tr>
<td>M - Manual</td>
<td>100</td>
<td>102.18</td>
<td>2.18</td>
<td>26.60</td>
<td>.51</td>
</tr>
</tbody>
</table>

*Significant at the .05 level of confidence (2.02 Critical-Ratio is required for significance at the .05 level).

**Significant at the .01 level of confidence (2.71 Critical-Ratio is required for significance at the .01 level).

The data in Table 6 illustrate the differences in aptitudes between females confined twice or more and the national norms established by the General Aptitude Test Battery.

As in the total sample group comparison, aptitudes G (Intelligence), V (Verbal), and N (Numerical) were significantly different, except the level of confidence was .05 rather than .01 as in the total group sample. It is assumed that the small number of students in this sub-group
Table 6. Group 4 (females confined twice or more) aptitudes compared to GATB norms

<table>
<thead>
<tr>
<th>GATB aptitudes</th>
<th>GATB mean</th>
<th>Group 4 mean</th>
<th>Difference between means</th>
<th>Group 4 S.D.</th>
<th>Critical ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>G - Intelligence</td>
<td>100</td>
<td>90.41</td>
<td>9.59</td>
<td>16.76</td>
<td>2.36*</td>
</tr>
<tr>
<td>V - Verbal Aptitude</td>
<td>100</td>
<td>90.35</td>
<td>9.65</td>
<td>13.70</td>
<td>2.88*</td>
</tr>
<tr>
<td>N - Numerical Aptitude</td>
<td>100</td>
<td>91.34</td>
<td>8.66</td>
<td>15.39</td>
<td>2.30*</td>
</tr>
<tr>
<td>S - Spatial Aptitude</td>
<td>100</td>
<td>98.18</td>
<td>1.82</td>
<td>16.61</td>
<td>.45</td>
</tr>
<tr>
<td>P - Form Perception</td>
<td>100</td>
<td>106.35</td>
<td>6.35</td>
<td>16.66</td>
<td>1.56</td>
</tr>
<tr>
<td>Q - Clerical Perception</td>
<td>100</td>
<td>103.47</td>
<td>3.47</td>
<td>13.62</td>
<td>1.04</td>
</tr>
<tr>
<td>K - Motor Coordination</td>
<td>100</td>
<td>105.70</td>
<td>5.70</td>
<td>21.24</td>
<td>1.10</td>
</tr>
<tr>
<td>F - Finger Dexterity</td>
<td>100</td>
<td>105.82</td>
<td>5.82</td>
<td>34.03</td>
<td>.71</td>
</tr>
<tr>
<td>M - Manual Dexterity</td>
<td>100</td>
<td>103.70</td>
<td>3.70</td>
<td>26.54</td>
<td>.57</td>
</tr>
</tbody>
</table>

*Significant at the .05 level of confidence (2.13 Critical-Ratio is required for significance at the .05 level).
**Significant at the .01 level of confidence (2.95 Critical-Ratio is required for significance at the .01 level).

Causes the level of confidence to drop from .01 to .05. However, aptitude Q (Clerical Perception) was not different from the national norm, except that the standard deviation was below the average of 20, which would indicate that this sub-group of females does not have a large degree of variance in this aptitude within the group.
Summary

When the total sample group aptitude scores were compared to the national norms established by the General Aptitude Test Battery, aptitude M (Manual Dexterity) was significantly above the national norm at .01 level of confidence, and aptitude P (Form Perception) was significantly above the mean at the .05 level of confidence. Four aptitudes, G (Intelligence), V (Verbal), N (Numerical), and Q (Clerical Perception) were significantly below the national established norms at the .01 level of confidence.

Group 1 (males confined only once) was significantly above the average norm in only aptitude M (Manual Dexterity) at the .05 level, and below average norms in aptitudes G (Intelligence), V (Verbal), N (Numerical), and Q (Clerical Perception) at the .01 level, as well as aptitude F (Finger Dexterity) at the .05 level. Therefore, this sub-group has limited ability in five of the nine aptitudes.

Group 2 (males confined twice or more) was significantly above the national norms in aptitudes F (Finger Dexterity) at the .05 level of confidence, and aptitude M (Manual Dexterity) at the .01 level. This sub-group was below the average mean in aptitudes G (Intelligence), V (Verbal), N (Numerical), and Q (Clerical Perception) at the .01 level.

Group 3 (females confined once) was significantly above the national norms in aptitude P (Form Perception) at the .01 level, and below the established national norms in aptitudes G (Intelligence), V (Verbal), and N (Numerical) at the .01 level of significance.

Group 4 (females confined twice or more) was below national norms in aptitudes G (Intelligence), V (Verbal), and N (Numerical) at the
.05 level. However, the small number of students in this group could account for the small degree of significant differences.

Figure 1 on the following page was designed to show the relationship between the aptitude scores obtained by the total group and the sub-groups as they compare to the national mean score of 100 on the General Aptitude Test Battery.

The data illustrated in Figure 1 indicate that all of the groups were below the mean score of 100 for the General Aptitude Test Battery on aptitudes G (Intelligence), V (Verbal), and N (Numerical).

Data in Figure 1 also indicate that group 2 (males confined twice or more) was the lowest in the V (Verbal) aptitude, and highest in aptitude F (Finger Dexterity) and aptitude M (Manual Dexterity).

**Question 2**

What are the differences between the achievement of students aged 15.5 to 18.5 confined to the Utah State Industrial School and the norms established by the California Achievement Test?

The data relating to this question were obtained by comparing achievement results on the California Achievement Test to the established norms. The norms for the California Achievement Test, form x and y, were established in 1963. The test was given to all students at the institutions for academic placement purpose and serves to evaluate, diagnose, and measure achievement in relation to age and levels of performance.

The test yields scores indicating levels of grade placement in reading, arithmetic, language, and a total test battery score. These
Figure 1. Comparison of group aptitude mean scores on the General Aptitude Test Battery
scores were related to the students' chronological age to obtain the level of achievement for proper grade placement.

The data in Table 7 illustrate the comparison of mean month achievement level for each of the four composite scores of the total sample of 169 students and the normal grade placement level for students of the same average chronological age.

Since it was evident from the data that the student sample being tested differed significantly at the .01 level of confidence from the established norms, no statistical analysis was applied to the sample.

The data in Table 7 illustrate that the total group sample was significantly below the established average in all of the grade placement levels on each part of the California Achievement Test.

Table 7. Total group achievement level compared to CAT norms

<table>
<thead>
<tr>
<th>CAT</th>
<th>Mean months</th>
<th>Grade placement in years</th>
<th>Amount retarded in years</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reading</td>
<td>159.99</td>
<td>7.7</td>
<td>3.6</td>
</tr>
<tr>
<td>Arithmetic</td>
<td>157.48</td>
<td>7.5</td>
<td>3.8</td>
</tr>
<tr>
<td>Language</td>
<td>158.76</td>
<td>7.6</td>
<td>3.7</td>
</tr>
<tr>
<td>Total Battery</td>
<td>158.92</td>
<td>7.6</td>
<td>3.7</td>
</tr>
</tbody>
</table>

Average Chronological Age--16 years, 9 months
Normal Grade Placement in Years--11.3
Normal Grade Placement in Months--201
The amount of retardation ranged from 3.6 to 3.8 grade levels. Therefore, although the average chronological age of the group indicates that they should be in the eleventh grade in school, they are capable of a performance level of only upper seventh grade.

It should be noted that the amount of retardation in each of the test areas differs very little from area to area, indicating a great consistency in the amount of retardation.

The data in Table 8 illustrate the first of the sub-group findings related to the California Achievement Test. This Table indicates the grade placement level of Group 1, males confined to the institution once, as compared to normal grade placement on the California Achievement Test.

Table 8. Group 1 (males confined once) achievement levels compared to CAT norms

<table>
<thead>
<tr>
<th>CAT</th>
<th>Mean placement in years</th>
<th>Grade placement in years</th>
<th>Amount retarded in years</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reading</td>
<td>160.98</td>
<td>7.8</td>
<td>3.4</td>
</tr>
<tr>
<td>Arithmetic</td>
<td>157.91</td>
<td>7.6</td>
<td>3.6</td>
</tr>
<tr>
<td>Language</td>
<td>155.51</td>
<td>7.4</td>
<td>3.8</td>
</tr>
<tr>
<td>Total Battery</td>
<td>157.81</td>
<td>7.6</td>
<td>3.6</td>
</tr>
</tbody>
</table>

Average Chronological Age--16 years, 7 months
Normal Grade Placement in Years--11.2
Normal Grade Placement in Months--199
The data in Table 8 illustrate that the over-all achievement level of this group was well below what could normally be expected of students in this age group. The amount of retardation ranges from 3.4 grade levels in arithmetic to 3.8 grade levels in the language area. Chronologically this group should be capable of performing beginning eleventh grade work, but based on actual achievement as measured by the California Achievement Test, they can perform at only middle seventh grade level academically.

The data in Table 9 illustrate the academic grade placement of sub-group 2, males confined twice or more at the institution, compared to normal grade placement levels established by the California Achievement Test.

Table 9. Group 2 (males confined twice or more) achievement levels compared to CAT norms

<table>
<thead>
<tr>
<th>CAT</th>
<th>Mean months</th>
<th>Grade placement in years</th>
<th>Amount retarded in years</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reading</td>
<td>155.76</td>
<td>7.4</td>
<td>3.7</td>
</tr>
<tr>
<td>Arithmetic</td>
<td>153.47</td>
<td>7.2</td>
<td>3.9</td>
</tr>
<tr>
<td>Language</td>
<td>151.87</td>
<td>7.1</td>
<td>4.0</td>
</tr>
<tr>
<td>Total Battery</td>
<td>154.53</td>
<td>7.3</td>
<td>3.8</td>
</tr>
</tbody>
</table>

Average Chronological Age—16 years, 6 months
Normal Grade Placement in Years—11.1
Normal Grade Placement in Months—198
The data in Table 9 indicate the over-all achievement level of group 2 and relates the level of retardation compared to the established norms. The normal grade placement in school for this group should be at the beginning of the eleventh grade; however, according to their achievement on the California Achievement Test, they are capable of performing only beginning seventh grade work. The deficiency in grade placement ranges from 3.7 in reading to 4.0 in language, which represents a slightly larger degree of variability than in the total group sample.

The data in Table 10 illustrate the academic grade placement of sub-group 3, females confined once at the institution, compared to normal grade placement levels established by the California Achievement Test.

Table 10. Group 3 (females confined once) achievement levels compared to CAT norms

<table>
<thead>
<tr>
<th>CAT</th>
<th>Mean months</th>
<th>Grade placement in years</th>
<th>Amount retarded in years</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reading</td>
<td>162.13</td>
<td>8.0</td>
<td>3.4</td>
</tr>
<tr>
<td>Arithmetic</td>
<td>159.74</td>
<td>7.7</td>
<td>3.7</td>
</tr>
<tr>
<td>Language</td>
<td>169.18</td>
<td>8.5</td>
<td>2.9</td>
</tr>
<tr>
<td>Total Battery</td>
<td>163.62</td>
<td>8.3</td>
<td>8.1</td>
</tr>
</tbody>
</table>

Average Chronological Age--16 years, 10 months
Normal Grade Placement in Years--11.1
Normal Grade Placement in Months--202
The data in Table 10 indicate that the females in group 3 were below the expected average of achievement academically for students in their age area. This group was the least retarded in language, being only 2.9 grade levels below the norm; however, they are retarded 3.7 levels in arithmetic.

This group, according to their chronological age, should be performing at about middle eleventh grade level, but according to actual achievement they were capable of performing only at the beginning eighth grade level.

The data in Table 11 illustrate the academic grade placement of sub-group 4, females confined twice or more at the institution, compared to normal group placement levels established by the California Achievement Test.

Table 11. Group 4 (females confined twice or more) achievement levels compared to CAT norms

<table>
<thead>
<tr>
<th>CAT</th>
<th>Mean months</th>
<th>Grade placement in years</th>
<th>Amount retarded in years</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reading</td>
<td>162.29</td>
<td>8.0</td>
<td>3.8</td>
</tr>
<tr>
<td>Arithmetic</td>
<td>161.18</td>
<td>7.9</td>
<td>3.9</td>
</tr>
<tr>
<td>Language</td>
<td>166.06</td>
<td>8.3</td>
<td>3.5</td>
</tr>
<tr>
<td>Total Battery</td>
<td>164.18</td>
<td>8.1</td>
<td>3.7</td>
</tr>
</tbody>
</table>

Average Chronological Age--17 years, 2 months
Normal Grade Placement in Years--11.8
Normal Grade Placement in Months--206
The data in Table 11 indicate the over-all achievement level of this sub-group as being considerably below what could be expected of a normal group sample in this age bracket. Group 4 was the most seriously retarded group in arithmetic, 3.9 levels, and least retarded in language, 3.5 levels.

Chronologically this group should be achieving academically at the late eleventh grade level, but based on their California Achievement Test Scores they are capable of doing only eighth grade work.

Summary

From the data contained in Tables 7 through 11 it was determined that the total group sample, as well as the students in the sub-group samples, does not achieve academically up to the norms established by the California Achievement Test.

Although the average age range for the sub-groups varies from 16 years, 6 months to 17 years, 2 months, approximately the same range of under achievement exists in all sub-groups. The females confined only once have the over-all lowest level of retardation, and the boys confined twice or more show the greatest level of retardation.

The only achievement test area which was not at least a full 3.0 grades below the average normal population was the language area for females confined once, where the amount of retardation was 2.9 years.

The total sample group of students was identified as being 3.7 grade levels retarded academically on the total test battery. These findings were based on norms established by the California Achievement Test.

Figure 2 will graphically illustrate the amount of retardation determined by the scores on the California Achievement Test.
Total group
Group 1--Males confined once
Group 2--Males confined twice or more
Group 3--Females confined once
Group 4--Females confined twice or more

Figure 2. Amount of group retardation on the California Achievement Test
Question 3

What are the differences between the aptitudes and achievement of students aged 15.5 to 18.5 who have been confined to the institution only once, as compared to those who have been confined to the institution more than once?

During the presentation of data relating to questions 1 and 2, no attempt was made to analyze comparisons between the four sub-groups. The data presented in the first two questions were used to establish the differences in aptitude and achievement of all groups as compared to national norms established by the General Aptitude Test Battery and the California Achievement Test.

In order to fully understand the total degree of group differences it was necessary to make a comparison between sub-groups in terms of aptitudes and achievement.

The data in Table 12 illustrate a composite table of the mean scores and standard deviations as they were presented in Tables 3 through 6 in question 1.

In order to ascertain if there were any differences in aptitudes between the sub-groups, each of the nine aptitudes in one sub-group was compared to the same aptitude scores in the other three sub-groups. The significant difference between the means were analyzed by formula 56b (Garrett, 1965, p. 214), and the critical-ratio test for significance. The critical-ratio test for significance was based on the sample numbers being compared.
Table 12. Composite sub-group aptitude scores on the GATB

<table>
<thead>
<tr>
<th></th>
<th>Group 1 (N = 68)</th>
<th></th>
<th>Group 2 (N = 45)</th>
<th></th>
<th>Group 3 (N = 39)</th>
<th></th>
<th>Group 4 (N = 17)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>S.D.</td>
<td>Mean</td>
<td>S.D.</td>
<td>Mean</td>
<td>S.D.</td>
<td>Mean</td>
<td>S.D.</td>
</tr>
<tr>
<td>G - Intelligence</td>
<td>89.87</td>
<td>17.07</td>
<td>89.97</td>
<td>15.63</td>
<td>88.97</td>
<td>16.48</td>
<td>90.41</td>
<td>16.77</td>
</tr>
<tr>
<td>V - Verbal Aptitude</td>
<td>87.69</td>
<td>14.28</td>
<td>84.87</td>
<td>13.38</td>
<td>90.36</td>
<td>13.43</td>
<td>90.35</td>
<td>13.70</td>
</tr>
<tr>
<td>N - Numerical Aptitude</td>
<td>87.63</td>
<td>19.01</td>
<td>91.76</td>
<td>18.64</td>
<td>89.28</td>
<td>17.54</td>
<td>91.65</td>
<td>15.39</td>
</tr>
<tr>
<td>S - Spatial Aptitude</td>
<td>101.03</td>
<td>18.66</td>
<td>101.96</td>
<td>16.70</td>
<td>101.64</td>
<td>20.72</td>
<td>98.12</td>
<td>16.61</td>
</tr>
<tr>
<td>P - Form Perception</td>
<td>97.79</td>
<td>19.18</td>
<td>103.87</td>
<td>20.79</td>
<td>110.36</td>
<td>17.16</td>
<td>106.35</td>
<td>16.66</td>
</tr>
<tr>
<td>Q - Clerical Perception</td>
<td>91.62</td>
<td>11.13</td>
<td>93.36</td>
<td>12.73</td>
<td>103.26</td>
<td>13.76</td>
<td>103.47</td>
<td>13.62</td>
</tr>
<tr>
<td>K - Motor Coordination</td>
<td>95.57</td>
<td>21.67</td>
<td>104.42</td>
<td>24.06</td>
<td>102.51</td>
<td>14.13</td>
<td>105.71</td>
<td>21.24</td>
</tr>
<tr>
<td>F - Finger Dexterity</td>
<td>93.09</td>
<td>25.58</td>
<td>109.80</td>
<td>24.77</td>
<td>98.54</td>
<td>27.33</td>
<td>105.82</td>
<td>34.03</td>
</tr>
<tr>
<td>M - Manual Dexterity</td>
<td>107.91</td>
<td>24.44</td>
<td>120.49</td>
<td>23.30</td>
<td>102.18</td>
<td>26.61</td>
<td>103.71</td>
<td>26.54</td>
</tr>
</tbody>
</table>
In order to more clearly report the data relating to significant differences between the mean aptitude scores in Table 12, it was necessary to construct Table 13.

The data presented in Table 13 identify the sub-groups and those aptitudes which were found to be significantly different when compared from one sub-group to the others. The table first indicates the number of the sub-groups being compared, and then identifies the aptitudes which showed a significant difference between the indicated sub-groups.

Table 13. Comparison of aptitude differences between sub-groups on the GATB

<table>
<thead>
<tr>
<th>Sub-Groups</th>
<th>Aptitude* difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 to 2</td>
<td>F (Finger Dexterity)</td>
</tr>
<tr>
<td></td>
<td>M (Manual Dexterity)</td>
</tr>
<tr>
<td>1 to 3</td>
<td>Q (Clerical Perception)</td>
</tr>
<tr>
<td></td>
<td>P (Form Perception)</td>
</tr>
<tr>
<td>1 to 4</td>
<td>Q (Clerical Perception)</td>
</tr>
<tr>
<td></td>
<td>F (Finger Dexterity)</td>
</tr>
<tr>
<td>2 to 3</td>
<td>Q (Clerical Perception)</td>
</tr>
<tr>
<td></td>
<td>M (Manual Dexterity)</td>
</tr>
<tr>
<td>2 to 4</td>
<td>Q (Clerical Perception)</td>
</tr>
<tr>
<td></td>
<td>M (Manual Dexterity)</td>
</tr>
<tr>
<td>3 to 4</td>
<td>No Differences</td>
</tr>
</tbody>
</table>

*Each of the above differences in aptitudes from one sub-group to another was significant at the .01 level of confidence.
The data in Table 13 illustrate that generally males and females differ significantly in aptitudes P (Form Perception), Q (Clerical Perception), F (Finger Dexterity), and M (Manual Dexterity). Both male groups differ from both female groups in aptitude Q (Clerical Perception).

Sub-group 1 (males confined once) differs from group 2 (males confined more than once) in aptitude F (Finger Dexterity), and aptitude M (Manual Dexterity). Group 1 (males confined once) was different from sub-group 3 (females confined once) in aptitude P (Form Perception), and from sub-group 4 (females confined more than once) in aptitude F (Finger Dexterity).

Group 2 (males confined more than once) was different from sub-group 3 (females confined once), and 4 (females confined more than once) in aptitude M (Manual Dexterity).

The females in sub-groups 3 and 4 did not show any significant differences in their aptitudes.

The data presented in Table 14 are a composite table of mean month scores and standard deviations as presented in Tables 8 through 11 in question 2, relating to achievement levels.

In order to determine the differences between the sub-groups, each of the four achievement scores in one group was compared to the same achievement score in the other three sub-groups. This comparison was accomplished by using the significance of difference between means, formula 56b (Garrett, 1965, p. 214), and the critical-ratio test.

In comparing the mean differences of the sub-group scores in the area of achievement, it was discovered that the groups differ in only one of the four achievement levels. Both male groups (1 and 2) differ
Table 14. Composite sub-group comparisons in achievement levels

<table>
<thead>
<tr>
<th></th>
<th>Group 1</th>
<th></th>
<th>Group 2</th>
<th></th>
<th>Group 3</th>
<th></th>
<th>Group 4</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>S.D.</td>
<td>Mean</td>
<td>S.D.</td>
<td>Mean</td>
<td>S.D.</td>
<td>Mean</td>
<td>S.D.</td>
</tr>
<tr>
<td>Reading</td>
<td>160.99</td>
<td>32.96</td>
<td>155.76</td>
<td>27.08</td>
<td>162.13</td>
<td>28.87</td>
<td>162.29</td>
<td>26.61</td>
</tr>
<tr>
<td>Arithmetic</td>
<td>157.91</td>
<td>21.97</td>
<td>153.47</td>
<td>17.78</td>
<td>159.74</td>
<td>20.49</td>
<td>161.18</td>
<td>18.70</td>
</tr>
<tr>
<td>Language</td>
<td>155.51</td>
<td>26.82</td>
<td>151.87</td>
<td>21.03</td>
<td>169.18</td>
<td>22.63</td>
<td>166.07</td>
<td>18.37</td>
</tr>
<tr>
<td>Total Battery</td>
<td>155.80</td>
<td>27.36</td>
<td>154.53</td>
<td>20.38</td>
<td>163.62</td>
<td>22.51</td>
<td>163.18</td>
<td>17.92</td>
</tr>
</tbody>
</table>
from both female groups (3 and 4) in their achievement level in language. Male group 1 (confined once) was significantly different at the .05 level of confidence in language from both female groups, while male group 2 (confined more than once) was significantly different at the .01 level of confidence in language from sub-groups 3 and 4 (females).

Summary

When presenting data related to question 3 it was discovered that there were some differences between the sub-group samples of males and females in both aptitudes and achievement levels. These differences were significant in all cases at the .01 level of confidence.

In aptitudes, the males differed from the females in aptitudes P (Form Perception), Q (Clerical Perception), F (Finger Dexterity), and M (Manual Dexterity). The two male groups differed from each other in aptitudes F (Finger Dexterity) and M (Manual Dexterity). There was no significant difference in aptitudes between the two female sub-groups.

In achievement level, the groups were different in only the language area. The males in sub-group 1 (confined once) were significantly different at the .05 level of confidence from both of the female groups, and group 2 (males confined more than once) was significantly different from both female groups at the .01 level of confidence.

Question 4

Which Occupational Aptitude Patterns are most prevalent among the 15.5 to 18.5 year old students confined to the Utah State Industrial School?
The preceding three questions were designed to measure the differences in aptitudes of the total group and sub-groups compared to national norms established by the General Aptitude Test Battery, to measure achievement levels of the total group and sub-groups against those norms established by the California Achievement Test, and to make comparisons between the sub-groups related to aptitudes and achievement. These comparisons of aptitudes and achievement measure the strengths and weaknesses of the group as it relates to the general populous, and as the sub-groups compare to each other, but they do not indicate the occupational competencies of the sample group.

The data presented to interpret question 4 were designed to enumerate the group occupational competencies based on the Occupational Aptitude Patterns of the General Aptitude Test Battery. Each of the 36 Occupational Aptitude Patterns was established by the United States Employment Service. Although these patterns have been changed often since they were established, this study will be concerned with the latest Occupational Aptitude Patterns identified in 1966, and based on the multiple cut-off level of the General Aptitude Test Battery aptitudes. Within each Occupational Aptitude Level, a series of occupations requiring certain aptitudes are identified. (GATB Manual, Section II, 1966) The occupations are identified by a Dictionary of Occupational Titles number. This Dictionary of Occupational Titles carries a complete description of the requirements for each occupation.

In order to clarify the Occupational Aptitude Patterns, the following sample has been included. From each of the Occupational Aptitude Patterns the following information can be obtained: (1) three aptitudes of the
Occupational Aptitude Pattern, (2) the multiple-cutting scores for the aptitudes, (3) occupations which require these aptitudes, and (4) identification of occupations by Dictionary of Occupational Titles numbers.

OAP - 23

GATB NORMS

<table>
<thead>
<tr>
<th>Aptitudes</th>
<th>Adult</th>
<th>Grade 10</th>
<th>Grade 9</th>
</tr>
</thead>
<tbody>
<tr>
<td>N (Numerical Aptitude)</td>
<td>95</td>
<td>90</td>
<td>88</td>
</tr>
<tr>
<td>P (Form Perception)</td>
<td>100</td>
<td>97</td>
<td>92</td>
</tr>
<tr>
<td>Q (Clerical Perception)</td>
<td>105</td>
<td>101</td>
<td>96</td>
</tr>
</tbody>
</table>

Adding-Machine Operator, 216.488  

*Calculating Machine Operator, 216.488, S-90  
*Comptometer Operator, 216.488, S-90  
Posting Clerk, 219.588  
Posting Machine Operator I, 219.588

*A test development study has been conducted for this occupation and a significant correlation has been obtained between the OAP norms and the criterion for this occupation. (GATB Manual, Sec. II, 1966, p. 35)

In order to identify the specific occupations within each Occupational Aptitude Pattern, it is necessary to consult the General Aptitude Test Battery Manual, Section II, Norms, 1966.

The data in Table 15 illustrate the number of percentages of each group qualifying for each of the Occupational Aptitude Patterns. The number of qualifying students in each group was converted into percentages since the number of students in each group was not the same. The percentage was based on the number of qualifying students within each group, related to the total number within the group; therefore, the column percentages will not equal 100 percent.
Table 15. Number and percentage of students qualifying for each of the 36 Occupational Aptitude Patterns

<table>
<thead>
<tr>
<th>Occupational Aptitude Patterns</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
<th>11</th>
<th>12</th>
<th>13</th>
<th>14</th>
<th>15</th>
<th>16</th>
<th>17</th>
<th>18</th>
<th>19</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group 1 (Males Confined Once) N = 68</td>
<td>1</td>
<td>3</td>
<td>7</td>
<td>4</td>
<td>14</td>
<td>7</td>
<td>10</td>
<td>13</td>
<td>16</td>
<td>21</td>
<td>23</td>
<td>8</td>
<td>7</td>
<td>21</td>
<td>24</td>
<td>27</td>
<td>34</td>
<td>31</td>
<td>37</td>
</tr>
<tr>
<td></td>
<td>02</td>
<td>04</td>
<td>10</td>
<td>06</td>
<td>21</td>
<td>10</td>
<td>15</td>
<td>19</td>
<td>24</td>
<td>31</td>
<td>34</td>
<td>12</td>
<td>10</td>
<td>31</td>
<td>35</td>
<td>40</td>
<td>50</td>
<td>46</td>
<td>54</td>
</tr>
<tr>
<td>Group 2 (Males Confined Twice or More) N = 45</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>7</td>
<td>3</td>
<td>4</td>
<td>6</td>
<td>8</td>
<td>12</td>
<td>14</td>
<td>7</td>
<td>7</td>
<td>16</td>
<td>14</td>
<td>21</td>
<td>27</td>
<td>27</td>
<td>30</td>
</tr>
<tr>
<td></td>
<td>02</td>
<td>02</td>
<td>04</td>
<td>07</td>
<td>16</td>
<td>07</td>
<td>09</td>
<td>13</td>
<td>18</td>
<td>27</td>
<td>31</td>
<td>16</td>
<td>16</td>
<td>36</td>
<td>31</td>
<td>47</td>
<td>60</td>
<td>60</td>
<td>67</td>
</tr>
<tr>
<td>Group 3 (Females Confined Once) N = 39</td>
<td>1</td>
<td>4</td>
<td>5</td>
<td>9</td>
<td>6</td>
<td>8</td>
<td>9</td>
<td>13</td>
<td>12</td>
<td>14</td>
<td>13</td>
<td>13</td>
<td>12</td>
<td>14</td>
<td>17</td>
<td>20</td>
<td>24</td>
<td>24</td>
<td></td>
</tr>
<tr>
<td></td>
<td>00</td>
<td>03</td>
<td>10</td>
<td>13</td>
<td>23</td>
<td>15</td>
<td>21</td>
<td>23</td>
<td>33</td>
<td>31</td>
<td>36</td>
<td>33</td>
<td>33</td>
<td>31</td>
<td>36</td>
<td>44</td>
<td>51</td>
<td>62</td>
<td>62</td>
</tr>
<tr>
<td>Group 4 (Females Confined Twice or More) N = 17</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>2</td>
<td>2</td>
<td>3</td>
<td>5</td>
<td>6</td>
<td>6</td>
<td>4</td>
<td>6</td>
<td>5</td>
<td>5</td>
<td>7</td>
<td>11</td>
<td>9</td>
<td>13</td>
<td></td>
</tr>
<tr>
<td></td>
<td>00</td>
<td>06</td>
<td>06</td>
<td>12</td>
<td>18</td>
<td>12</td>
<td>12</td>
<td>18</td>
<td>29</td>
<td>35</td>
<td>35</td>
<td>24</td>
<td>35</td>
<td>29</td>
<td>29</td>
<td>41</td>
<td>65</td>
<td>53</td>
<td>76</td>
</tr>
<tr>
<td>Total Group N = 169</td>
<td>2</td>
<td>6</td>
<td>14</td>
<td>14</td>
<td>33</td>
<td>18</td>
<td>24</td>
<td>31</td>
<td>42</td>
<td>51</td>
<td>57</td>
<td>32</td>
<td>33</td>
<td>54</td>
<td>47</td>
<td>72</td>
<td>92</td>
<td>91</td>
<td>04</td>
</tr>
<tr>
<td></td>
<td>01</td>
<td>04</td>
<td>08</td>
<td>08</td>
<td>20</td>
<td>11</td>
<td>14</td>
<td>18</td>
<td>25</td>
<td>30</td>
<td>34</td>
<td>20</td>
<td>20</td>
<td>32</td>
<td>34</td>
<td>43</td>
<td>54</td>
<td>54</td>
<td>62</td>
</tr>
</tbody>
</table>
Table 15. Continued

|   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 | 36 |   |   |   |   |   |   |   |   |   |   |
| Group 1 (Males Confined Once) N = 68 |
| 38 | 32 | 42 | 8  | 23 | 28 | 30 | 37 | 51 | 34 | 33 | 42 | 44 | 29 | 29 | 36 | 3  | 0  | 0  | Number Qualified |
| 56 | 47 | 62 | 12 | 34 | 41 | 44 | 54 | 75 | 49 | 49 | 62 | 65 | 43 | 43 | 53 | 04 | 00 | 00 | Percentage |
| Group 2 (Males Confined Twice or More) N = 45 |
| 33 | 26 | 34 | 6  | 19 | 26 | 28 | 33 | 41 | 29 | 28 | 33 | 37 | 24 | 30 | 30 | 6  | 1  | 0  | Number Qualified |
| 73 | 58 | 75 | 13 | 42 | 58 | 62 | 73 | 91 | 64 | 62 | 73 | 82 | 53 | 60 | 60 | 13 | 02 | 00 | Percentage |
| Group 3 (Females Confined Once) N = 39 |
| 23 | 25 | 25 | 9  | 17 | 22 | 22 | 19 | 31 | 23 | 20 | 31 | 26 | 23 | 20 | 25 | 10 | 0  | 0  | Number Qualified |
| 59 | 64 | 64 | 23 | 44 | 56 | 56 | 49 | 80 | 59 | 51 | 76 | 66 | 59 | 51 | 64 | 26 | 00 | 00 | Percentage |
| Group 4 (Females Confined Twice or More) N = 17 |
| 11 | 12 | 11 | 5  | 10 | 10 | 9  | 10 | 13 | 11 | 10 | 12 | 13 | 12 | 9  | 12 | 2  | 0  | 0  | Number Qualified |
| 65 | 71 | 65 | 29 | 59 | 59 | 53 | 59 | 76 | 65 | 59 | 71 | 76 | 71 | 53 | 71 | 12 | 00 | 00 | Percentage |
| Total Group N = 169 |
| 105| 95 | 112| 28 | 69 | 86 | 89 | 99 | 136| 97 | 91 | 118| 120| 88 | 88 | 103| 21 | 1  | 0  | Number Qualified |
| 62 | 56 | 66 | 17 | 41 | 51 | 53 | 59 | 80 | 57 | 54 | 70 | 71 | 52 | 52 | 61 | 12 | 00*| 00 | Percentage |

*Less than 1%
In order to determine if the groups were significantly different from one another, the percentages were compared using formula 64 (Garrett, 1965, p. 235).

In order to accurately interpret the meaning of Table 15, it would be necessary to first establish the criteria for evaluating it. From a practical point of view, those Occupational Aptitude Patterns for which 100 percent of the students qualify would be the ideal basis for a vocational program; however, this figure is not realistic. It is highly improbable that this uniform situation would ever arise at the Utah State Industrial School since the student population is a very heterogeneous group rather than a homogeneous one.

Therefore, a more realistic view must be taken in order to properly interpret the data in Table 15. It will be necessary to establish a percentage limit which would benefit a logical portion of the students.

It should also be mentioned that students may qualify in none or all of these Occupational Aptitude Patterns; therefore, it is necessary to interpret each individual's aptitude abilities in order to select the most appropriate program for the individual.

From the data presented in Table 15 it was determined that only groups 1 (males confined once) and 2 (males confined more than once) were significantly different at the .01 level, and this difference was in Occupational Aptitude Patterns 27 and 28. However, because each of the four sub-groups has a relatively small number of students within these groups, a true measure of the differences was not obtained.

The data in Table 15 indicate that 80 percent of the students qualified for OAP-28. The minimum multiple cut-off aptitude score for
OAP-28 is 75 in aptitude S (Spatial), P (Form Perception), and M (Manual Dexterity). There are 23 specific occupations listed for this OAP. These occupations vary from dental-laboratory technician to machine operators or veneer grader (GATB Manual, Sec. II, 1966, p. 40).

The next most prevalent Occupational Aptitude Patterns were OAP-31, and OAP-32. These two Occupational Aptitude Patterns had at least 70 percent of the sample qualifying. The minimum aptitude requirements for OAP-31 were scores of 85 in aptitude P (Form Perception), 80 for aptitude K (Motor Coordination), and 80 for aptitude M (Manual Dexterity). A total of 68 specific occupations are listed for this Occupational Aptitude Pattern. These occupations range from counter girl to farm hand and typewriter serviceman. OAP-32 requires a minimum aptitude score of 75 in P (Form Perception), 80 in F (Finger Dexterity), and 80 in M (Manual Dexterity). There are 111 specific occupations listed for this Occupational Aptitude Pattern. These occupations range from apple pickers to machine feeders or zipper sewers (GATB Manual, Sec. II, 1966, p. 43).

If we consider only individual sub-groups, the percentage could be established at random. For example, if 80 percent was the level set, sub-groups 1 (males confined once) and 4 (females confined more than once) would have no qualifiers, while group 2 (males confined more than once) would have qualified in one Occupational Aptitude Pattern, OAP-32 and group 3 (females confined once) would have qualified in OAP-28.

Group 2 (males confined more than once) had the highest percentage of qualifying students at 91 percent for OAP-28, while groups 3 (females confined once) and 4 (females confined more than once) had the lowest with no qualifying students in OAP-1.
It should be pointed out that the category All and None in the Occupational Aptitude Pattern row in the table are not constructed the same as the other 36 Occupational Aptitude Patterns. The All category identifies students who qualify for all of the 36 patterns. Sub-group 2 (males confined more than once) had one student in this area. The category None identifies students who do not qualify for any of the 36 Occupational Aptitude Patterns. Since this category does not contain any numbers it was assumed that all of the students tested have qualified in at least 1 of the 36 Occupational Aptitude Patterns.

The data in Table 16 were presented to clarify the previous table and to illustrate the Occupational Aptitude Patterns that each sub-group and the total group qualify for by percentages.

It should be remembered when considering this table, also, that a student can qualify for all or none of the Occupational Aptitude Patterns.

From the data presented in Table 16 is shown that less than 10 percent of the total group qualify for OAP-1, OAP-2, OAP-3, and OAP-4 and less than 20 percent qualify for OAP-2, OAP-7, OAP-3, OAP-23, and OAP-26, and 50 percent of the total group qualify for ten of the Occupational Aptitude Patterns, 70 percent of the total group qualify for OAP-31 and OAP-32, and 80 percent of the total group qualify for OAP-28.

Summary

The data presented in answering question 4 illustrate the numbers and percentages of students who qualify for each of the 36 Occupational Aptitude Patterns.

In order to fully utilize the data it has to be assumed that a certain percentage of qualifying students in a pattern justifies a
Table 16. Comparison of Occupational Aptitude Patterns by groups and percentages

<table>
<thead>
<tr>
<th>Percentage qualifying</th>
<th>Group 1</th>
<th>Group 2</th>
<th>Group 3</th>
<th>Group 4</th>
<th>Group total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 10%</td>
<td>1,2,4,36</td>
<td>1,2,3,4,6</td>
<td>1,2</td>
<td>1,2,3</td>
<td>1,2,3,4</td>
</tr>
<tr>
<td>10 - 19%</td>
<td>3,6,7,8,12,13,23</td>
<td>5,8,9,12,13,23,36</td>
<td>3,4,6</td>
<td>4,5,6,7,8,36</td>
<td>6,7,8,23,36</td>
</tr>
<tr>
<td>20 - 29%</td>
<td>5,9</td>
<td>10</td>
<td>5,7,8,23,36</td>
<td>9,12,14,15</td>
<td>5,9,12,13</td>
</tr>
<tr>
<td>30 - 39%</td>
<td>10,11,14,15,23,24</td>
<td>11,14,15</td>
<td>9,10,11,12,13,14,15</td>
<td>10,11,13</td>
<td>10,11,14,15</td>
</tr>
<tr>
<td>40 - 49%</td>
<td>16,18,21,23,25,26,29,30,33,34</td>
<td>16,24</td>
<td>16,24,27</td>
<td>16</td>
<td>16,24</td>
</tr>
<tr>
<td>50 - 59%</td>
<td>17,19,20,27,35</td>
<td>21,25,33</td>
<td>17,20,25,26,29,30,33,34</td>
<td>18,24,25,34</td>
<td>17,18,21,25,26,27,29,30,33,34</td>
</tr>
<tr>
<td>60 - 69%</td>
<td>17,18,19,17,20,25,34,35</td>
<td>18,19,21,22,32,35</td>
<td>17,20,22,29</td>
<td>19,20,22,35</td>
<td></td>
</tr>
<tr>
<td>70 - 79%</td>
<td>17,18,19,20,22,27,31,34,35</td>
<td>18,19,21,31</td>
<td>19,21,28,31,32,33,35</td>
<td>31,32</td>
<td></td>
</tr>
<tr>
<td>80 - 89%</td>
<td>32</td>
<td>28</td>
<td>28</td>
<td></td>
<td></td>
</tr>
<tr>
<td>More than 90%</td>
<td>28</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
specific school program related to that particular Occupational Aptitude Pattern. For example, if the accepted percentage for the total group was established at more than 39 percent aptitude requirement for Occupational Aptitude Patterns 1 through 15, plus OAP-23 and OAP-36, there would be no students qualify in these areas. However, if 40 percent was set at the minimum percentage, 68 of the 169 students in the sample group would have the requirements for Occupational Aptitude Patterns 16 through 35, excluding OAP-23.

Within the individual groups, the males of sub-group 2 (those confined more than once) had the highest percentage of acceptance in OAP-28, while the females in both groups did not have anyone qualify for OAP-1.

**Question 5**

Can the California Achievement Test and the General Aptitude Test Battery be used as measures of aptitudes and achievement of students 15.5 to 18.5 who are confined to the Utah State Industrial School? This question was raised in order to validate the procedure of utilizing the California Achievement Test and the General Aptitude Test Battery to establish the achievement levels and aptitudes of this particular sample group at the Utah State Industrial School.

It was assumed before the study was undertaken that the group would be non-verbal and under-achievers based on past testing. However, these facts should have little effect on the California Achievement Test, which is geared to measuring all students regardless of their limitations. However, the fact that the General Aptitude Test Battery is geared to
a chronological age rather than an achievement level, and includes paper-pencil tests for 7 of the 9 aptitudes tested, might have some effect on the results.

In order to be able to arrive at a more logical conclusion to this question, a three-fold analysis of the data has been included in this area: (1) a correlation matrix between variables, (2) an interpretation of aptitude data from question 1, and (3) an interpretation of achievement data from question 2.

To establish the relationship between the variables on the California Achievement Test and the General Aptitude Test Battery, a linear regression coefficient of correlation was computed. This relationship was expressed in a product-moment coefficient of correlation between any two variables. This relationship is illustrated in an intercorrelation matrix table. In order to discover the correlation between any two variables, a variable in the top row is compared to one in the side row, and where they intersect is the product-moment coefficient correlation.

The coefficient correlations shown in Table 17 are for the total group only. The sub-group correlations were not indicated because of the size of some of these sub-groups. This small number would produce a correlation which was unstable, therefore, it would have very little reliability in the prediction of student performance.

The data in Table 17 illustrate the inter-correlation matrix between the variables of the California Achievement Test and the General Aptitude Test Battery. The significance level was established from Table 25 (Garrett, 1965, p. 201). In order to have a significant
Table 17. Total group product-moment correlation matrix between variables

<table>
<thead>
<tr>
<th></th>
<th>GATB</th>
<th>CAT</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Verbal Aptitude</td>
<td>Numerical Aptitude</td>
</tr>
<tr>
<td>G - Intelligence</td>
<td>82</td>
<td>82</td>
</tr>
<tr>
<td>V - Verbal Aptitude</td>
<td>62</td>
<td>44</td>
</tr>
<tr>
<td>N - Numerical Aptitude</td>
<td>44</td>
<td>49</td>
</tr>
<tr>
<td>S - Spatial Aptitude</td>
<td>54</td>
<td>49</td>
</tr>
<tr>
<td>F - Form Perception</td>
<td>65</td>
<td>41</td>
</tr>
<tr>
<td>Q - Clerical Perception</td>
<td>46</td>
<td>23</td>
</tr>
<tr>
<td>K - Motor Coordination</td>
<td>35</td>
<td>39</td>
</tr>
<tr>
<td>F - Finger Dexterity</td>
<td>60</td>
<td>13</td>
</tr>
<tr>
<td>M - Manual Dexterity</td>
<td>20</td>
<td>20</td>
</tr>
<tr>
<td>R - Reading</td>
<td>77</td>
<td>89</td>
</tr>
<tr>
<td>A - Arithmetic</td>
<td>79</td>
<td>90</td>
</tr>
<tr>
<td>L - Language</td>
<td>94</td>
<td></td>
</tr>
</tbody>
</table>

Level of significance: .01 = .20 r, .05 = .15 r
relationship for the 169 students, the correlation must be .20 at the .01 level, and .15 at the .05 level. These two correlation ranges indicate that those correlations that exceed these numbers have some degree of relationship and some predictive value.

However, the closer the correlation is to the significance level, the lower its predictive power. Borg (1965, p. 282) cites four levels of group or individual correlations that can be used for prediction in a sample containing over 100 cases.

**Correlations ranging from .20 to .35**
Correlations at this level show a very slight relationship between the variables although this relationship may be statistically significant . . . Correlations at this level, however, are of no value in either individual or group prediction.

**Correlations ranging from .35 to .65**
Correlations in this range are statistically significant beyond the 1 percent level . . . Correlations at this level used singly are of little or no use for individual prediction because they yield only a few more correct predictions than could be accomplished by guessing or by using some chance selection procedure.

**Correlations ranging from .65 to .85**
Correlations at this level make possible group predictions that are accurate enough for most purposes. As we move toward the top of this range, group predictions can be made very accurately.

**Correlations over .85**
Correlations at this level indicate a close relationship between the two variables correlated . . . When correlations at this level are obtained, however, they are very useful for either individual or group prediction. (Borg, 1965, p. 282)

If the interpretation of the correlations from Table 17 is based on Borg's four levels of prediction, only the three variables of the California Achievement Test, R (Reading), A (Arithmetic), and L (Language), when correlated with the California Achievement Test total battery score can be used for individual predictions. Since these correlations exceed .90 in all cases, they establish an extremely high degree of relationship.
The aptitude variables of G (Intelligence), V (Verbal), and N (Numerical) on the General Aptitude Test Battery correlate very highly with themselves and each of the four California Achievement Test scores. Since most of these correlations range from .65 to .85, they can be used as group predictors as having a significant relationship.

At the other extreme, the General Aptitude Test Battery aptitude variables of K (Motor Coordination), F (Finger Dexterity), and M (Manual Dexterity) generally correlate very low with the other variables. This indicates that little relationship exists between these aptitudes and the other variables. Since all of the variables that were not significant at the .05 level were found within these three aptitudes, it indicates that they have little predictive group value. This means that they are only measures of themselves, and cannot be used to make inferences about other relationships.

The second and third areas of analysis of this question relate to data reported in question 1 and question 2, in order to attempt to substantiate using the California Achievement Test and the General Aptitude Test Battery as true measurements of student achievement and aptitude at the Utah State Industrial School.

From data presented in questions 1 and 2 it was established that the assumption relating to these students as being non-verbal and under-achievers was factual. In spite of the fact that the California Achievement Test is a paper-pencil test it can be assumed to be fairly accurate as a measure of achievement as it is designed for a group level rather than a chronological age. However, the high level of under-achievement on the California Achievement Test might indicate a possible problem.
of student comprehension of the General Aptitude Test Battery, at least in the aptitudes tested in the paper-pencil manner. It should at least be noted that all areas where the total group scored lower than the national norms were paper-pencil test aptitudes, and the one area where the sample group was significantly higher than the norm was an aptitude not tested in this manner.

Summary

The California Achievement Test would seem to be a valid measure of achievement for this sample group of students from the Utah State Industrial School. Even though it is a paper-pencil test, it is geared to all levels of performance; therefore, it can logically be assumed that it can effectively measure the achievement level of under-achievers. The writer feels that there is at least some doubt that a true measure of aptitude potential was obtained through the General Aptitude Test Battery. In order to qualify this statement, the following facts are offered for evaluation.

1. The over-all intelligence of the sample group is below normal as established by the Wechsler Intelligence Scale for Children.

2. The student sample group is retarded from 2.9 to 4.0 grade levels of achievement as established by the California Achievement Test.

3. The General Aptitude Test Battery is designed for twelfth grade (or adults), with norms adjusted for ninth or tenth grade, while the grade achievement level of the student test group is seventh and eighth grade levels.

4. On the two aptitudes of the General Aptitude Test Battery which are not paper-pencil tests the student test group scored average or above average.
Therefore, the writer feels that it is doubtful that on a paper-pencil test, designed for a chronological age group, this particular sample group, below average in intelligence and grade level achievement, would be able to perform in a manner which would produce a true evaluation of their aptitude potential.

**Question 6**

Based on established Occupational Aptitude Patterns, what type of vocational education curriculum would best meet the needs of the students confined at the Utah State Industrial School?

"No institution filled with a heterogeneous assortment of children whose only common denominator is that their treatment needs have not been met elsewhere, can do the necessary job for each child"

(Institutions Serving Delinquent Children, 1963, p. 9). From this quotation it is obvious that there is no one curriculum which is going to serve the vocational needs of every child at the institution, and so the goal of an effective vocational curriculum will be to provide a program which will benefit the majority of the students in the institution.

Before suggesting a type of curriculum for the Utah State Industrial School, it was felt necessary to determine what factors, other than the test results reported in this study, be given consideration in the formation of a vocational curriculum.

The first consideration must be the philosophy which determines the goals of the institution, and establishes what the institution is expected to accomplish. Most penologists emphasize that the purpose of institutionalizing young people should be rehabilitation, rather than
punishment, and feel that education is an important instrument for
rehabilitation. However, rehabilitation, in this instance, is usually
understood to mean helping the student recognize his worth as an
individual, and his potential as a member of society, rather than
providing specific occupational training. This rehabilitation implies
generally providing an environment in which all activities and
education are directed at getting the delinquent ready for a successful
return to community living.

Other influencing factors which have a direct bearing on the type
of educational curriculum which should be offered at an industrial
school can be summed up in this quotation from a government booklet
concerned with the training needs of young people in institutions:

Although some of these institutions provide training of
some sort, the relatively short period of confinement, the length
of time required to learn a trade, and the students frequent lack
of readiness to make a serious occupational choice, limit the kind
of training that can be given. For the most part, the delinquent
can only be introduced to an occupation or trade in a correctional
institution. For many, the vocational program is exploratory and
prevocational, offering information and a beginning in training.
(Young Workers: Their Special Training Needs, 1963, pp. 18-19)

As indicated in this quotation the short period of confinement must
be considered as a limiting factor in a vocational curriculum. Earlier
in this study it was established that the average length of confinement
at the Utah State Industrial School is nine months, and, therefore, this
factor will have a significant bearing on the type of curriculum presented.

In discussing another limiting consideration of curriculum, the
students' lack of readiness to make a vocational choice at this age,
Super (1957, p. 85) makes this observation: "It is obvious, then, that
the school is the adolescent exploratory institution par excellence . . .
The curriculum of the early years in high school . . . may properly be viewed as exploratory in its content and purpose." It has generally been accepted that specific occupational aspirations developed by adolescents during this period are relatively meaningless.

Another aspect of the vocational curriculum which should be considered is that this vocational curriculum should be directly related to the academic curriculum, not separated from it. The following description of a recommended total instructional program makes this clear.

The instructional program should embrace good educational content and practices, have curricula designed to meet the individual needs of the children and the full range of the children's academic levels, utilize significant educational approaches in all work programs, and integrate educational principles and practices with other relevant activities and services of the institutional program. Every aspect of the training school program having clearly defined training values, including vocational training, should be coordinated with the formalized instructional program of the training school.

(Institutions Serving Delinquent Children, 1963, pp. 73-74)

In addition to being closely integrated with the academic program, the vocational education curriculum must be extremely versatile. Although many of these students will enter the work world, some will return to the public schools, and others will seek some sort of specific occupational training. The objectives for vocational educators in these institutions related to curriculum could be stated as follows:

Just as each school must develop its philosophy and objectives and state them in terms that all can understand, so must each school plan the curricula suited to its own particular conditions of pupil population and environment. The curricula must provide for students who will return to grade or high school and for those who will go to work . . . (Institutions Serving Delinquent Children, 1963, pp. 77-78)
When considering all of the extenuating factors which have a direct bearing on the vocational education curriculum for industrial schools it might be concluded that the best vocational curriculum is an appropriate vocational curriculum, in that it is adjusted to meet the needs of the particular students in an institution.

In examining the needs of the students at the Utah State Industrial School data has been presented which indicates the aptitudes of these students, and from this data has been established the Occupational Aptitude Patterns for which the sample group of students qualify. In order to relate these Occupational Aptitude Patterns to a suggested type of curriculum, it was necessary to employ some sort of limiting factor. Obviously, any group with such a heterogeneous make-up will have a few individuals capable of advanced technical training, and some capable of practically no vocational training. As was indicated at the beginning of this area, it is highly impractical to assume that any curriculum can do the necessary job for every student.

Based on this philosophy, this analysis will limit the Occupational Aptitude Patterns considered to those for which at least 60 percent of the students qualify. It would seem impractical to suggest a type of vocational curriculum which would not benefit over half the students. It should, however, be mentioned that even if the percentage of students qualifying for certain Occupational Aptitude Patterns was lowered to just 50 percent, the same type of curriculum would be advantageous.

When considering Occupational Aptitude Patterns for which 60 percent of the students qualify, the vocational curriculum would be geared to seven Occupational Aptitude Patterns. These are OAP-28, OAP-31,
OAP-32, OAP-19, OAP-22, OAP-20, and OAP-35 (in order of numbers of students who qualify).

These seven Occupational Aptitude Patterns all represent occupations which could be described as semi or low skilled. Some of these seven Occupational Aptitude Patterns have as many as 100 specific occupations which would fall into a particular pattern.

The Occupational Aptitude Pattern which had the highest number of students qualify was OAP-28. (Eighty percent of students qualified for this pattern.) Using this Occupational Aptitude Pattern as an example it is possible to indicate what relationships exist between OAP-28 and a type of vocational curriculum.

Like the other six Occupational Aptitude Patterns for which 60 percent of the student sample qualify, OAP-28 contains occupations which are considered semi or low skilled. This implies that the jobs should be filled by individuals who are capable of more than just muscular energy, have some degree of judgment, but who have not completed any specific training.

Although some of the Occupational Aptitude Patterns for which 60 percent of the students qualify contain over 100 specific occupations, OAP-28 contains 23 listed occupations. It is obvious that it would be impossible to plan a curriculum which would train students specifically for each position listed. In addition, if it were possible to train them for all these specific occupations, there would be no reasonable assurance that these specific jobs would be available when the student was released. Normally, the type of jobs listed in these seven Occupational Aptitude Patterns are those which require very little prior training, and
what training is necessary can usually be accomplished quickly with a brief training session on the job.

However, it can be concluded that the hundreds of positions included in these seven Occupational Aptitude Patterns fall into a few general categories. In OAP-28, for example, 7 of the 23 jobs specify some type of machine operation. Therefore, if these students could be introduced to the general characteristics of machines and machine operation, the specific training could be accomplished quickly and efficiently.

Based on the limiting factors which need consideration when planning a vocational education curriculum, and the Occupational Aptitude Patterns for which at least 60 percent of the sample group qualify, the type of vocational curriculum which would best seem to meet the needs of the students at the Utah State Industrial School is a general vocational curriculum.

Bishop and Tolley (1963, p. 227) make the following observation relating to such a general vocational curriculum.

The philosophy underlying this type of curriculum is that basic skills are most vital to the student primarily because they influence the youths' attitude toward work and enhance his self-confidence. (Bishop and Tolley, 1963, p. 227)

The advantages of a general vocational curriculum for this specific group are as follows:

1. It will enable the student to be exposed to many different types of occupations, helping him to form more realistic occupational aspirations.

2. It will familiarize the student with the broad world of work.
3. It will help him acquire the basic fundamentals for getting a job.

4. It will generally improve work habits and attitudes.

5. It will not frustrate the majority of students with limited ability, but inspire them to establish realistic vocational goals.

Overall, the great advantage of the general vocational curriculum for these students is that it will provide them with better vocational understanding, so they will know what the world of work is about, and where they fit into the picture, as well as providing minimal skills required for likely entry jobs.

Considering a general vocational program and the advantages of such a program for this type of institution, a government publication has this comment:

The majority of boys and girls in training schools do not, in the main, possess the motivation or frustration tolerance required for the development of a high degree of vocational skill. As a result, the majority of these boys and girls will do unskilled work as long as they are in the labor market . . . The individual who sets his goals so far beyond his capabilities that it is impossible for him to approach even their achievement, is going to continue through life as a frustrated individual. (Institutional Rehabilitation of Delinquent Youth, 1962, p. 111)

There are other advantages to this type of general vocational curriculum which relate to the limiting factors of curriculum for these institutions discussed earlier in this question. This type of curriculum would lend itself much more readily to the time element involved, in that it would be far easier to pursue a general vocational program in a limited time. The dangers involved in attempting to provide adequate occupational training in a limited or broken time span often result in a shortened training program as an expedient. The results of such programs are described by Smith (1967, p. 19).
We cannot afford poor technical education programs for the disadvantaged or any group. They cost almost as much in dollars, waste the time and efforts of students and staff, disappoint employers with inadequately trained workers, and dissolution the youth we are dedicated to serve.

Another of the limiting factors described earlier was that most youths of this age are not prepared to make definite occupational choices, and an occupational training curriculum forces them to make such choices. Occupational choices made under such pressures usually lead to student frustrations and instructor and administrative disappointment, and eventually an ineffective program. Therefore, the general vocational program, by providing for instruction related to the broader and more basic skills, would avoid this problem in that students would be able to pursue some vocational education without having to make specific occupational choices.

Another advantage of the general vocational curriculum for this institution is that it would more adequately fit the needs of employers in industry. Robert Arthur discusses what industry expects of youths in these terms:

Industry expects the prospective employee to have determined his general field, to realize what will be required of him to pursue that field, and to have basic knowledge upon which to develop the skills it demands. He must have potential in 3 basic areas; aptitude, skill, and knowledge . . . skills, of course, are developed, but the young worker should have been subjected to basic fundamentals . . . it is important that the candidate's knowledge be basic and varied. (Robert Arthur, 1965, pp. 18-20)

A more immediate advantage of the general vocational program is that it can be implemented more effectively by the institution. The changing world of work demands continual modification of an occupational vocational program. This fact is illustrated in a quotation from Institutional Rehabilitation of Delinquent Youth (1962, p. 106).
Most training schools have tended to de-emphasize vocational training during the past two decades, since industry is changing so rapidly that they cannot hope to keep their tools up-to-date. . . This has led many training schools to emphasize the development of basic skills or the mastery of simple tools.

Also of practical value to the institution is the fact that it will be far easier to recruit qualified teachers for the general vocational program, rather than a specific occupational curriculum.

Another facet of the general vocational curriculum which should be implemented at the Utah State Industrial School is some form of work experience for the students. This work experience could either be a cooperative work study program which correlates vocational instruction in school to the work experience out of school, or a work study program which provides an opportunity for exploratory work experience. There can be little doubt that work experience is a valuable means of integrating education with the life of the community. It serves as a socializing and adjustment device through a generalized contact with the world of work.

That work experience is an invaluable part of the general vocational curriculum has been indicated in the following terms from Youth Employment Programs in Perspective.

The notion that work experience is the best way to impart basic job fundamentals has become so pervasive that it is included almost automatically in programming for the potential dropout or the unemployed youth. It has, in fact, become virtually the distinguishing characteristic of youth employment programs included regardless of the difficulty of providing work stations . . .
(Benjamin, Lesh, Freedman, 1965, p. 71)

In addition to suggesting a general vocational curriculum for the Utah State Industrial School combined with a meaningful work experience program, there is another aspect of the vocational curriculum which needs serious consideration.
A curriculum based on practical considerations and Occupational Aptitude Patterns only cannot succeed unless it provides for the individual personal factors which determine the ultimate degree of success a student might achieve in a particular field. Factors such as individual personality traits and physical capacities are of great importance when attempting to determine the success and satisfaction an individual will derive from work.

Because there are so many extenuating individual factors which determine the type of vocational training most beneficial for each youth, the final vocational curriculum suggestion to result from this study, is that the basis of the vocational curriculum at the Utah State Industrial School should be a strong vocational guidance program.

Only by utilizing the skill and training of a competent vocational guidance counselor can all of the extenuating factors relating to employment be put together, as there is no mathematical formula guaranteed to achieve success in this area.

As a part of this vocational guidance program, and in addition to personal contact with a vocational guidance counselor, it is suggested that a class in vocational guidance be included as a part of the vocational curriculum.

The purpose of this class would be to explore the various factors involved in making a suitable vocational choice, and to help the student develop a practical plan of action designed to assist him in achieving this vocational objective.

The advantage of including such a course in the curriculum is that usually these students have had limited opportunities to discover what
the demands of various occupations are, and consequently fail in future employment because they have made unrealistic occupational choices. Because of this lack of understanding and limited contact with the world of work, most students make vocational choices based only on interests, and research has demonstrated that the relationship between interest and aptitude scores is relatively low.

A class in vocational guidance, therefore, could aid the student in making a realistic vocational choice by providing the tools with which he could evaluate his own capabilities related to occupational demands.

Summary

In order to suggest a type of vocational education curriculum for the Utah State Industrial School, it was necessary to consider both institutional and individual limiting factors.

Based on established Occupational Aptitude Patterns for which 60 percent of the sample group of students qualify, a general vocational education curriculum was suggested. The rationale for this suggestion was based on the fact that the jobs contained within the seven Occupational Patterns for which 60 percent of the sample group qualify are semi or low skill occupations, which usually require only a short period of on-the-job training.

It was determined, however, that the occupations contained within the seven Occupational Aptitude Patterns could be grouped into several general categories, and the curriculum could be geared to provide basic skills in these general areas.
The advantage of the general vocational curriculum is that it can help prepare these students for employability by providing minimal skill development, but at the same time it can provide valuable preparation for their return to society by positively influencing their attitude toward work, and assisting them to make realistic occupational choices.

In answering this question, the assumption has been made that specific occupational training is not the major objective of the Utah State Industrial School, but that the emphasis should be placed on a vocational curriculum which provides some basic skills and knowledge of the vocational and industrial processes, and at the same time aids in formulating realistic general occupational choices, and provides the student with positive attitudes toward the world of work.
CHAPTER V

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

Summary

It is the purpose of this summary to provide a brief review of the research and findings of this study in order to facilitate an overall perspective of the problem and the suggested solution.

It was determined by the study that research indicates that there is a growing need to initiate and implement programs in vocational education for young people confined in penal institutions. Evidence was presented to establish that it is important that the aptitude and achievement levels of the students in such institutions be investigated before vocational curriculums are established.

The Utah State Industrial School, at the time of this study, was considering expanding its vocational education curriculum. This research had as its purpose a study of the aptitudes and achievement levels of a sample group of students confined to the institution in order to determine occupational aptitude patterns which could serve as guidelines for formulating a vocational curriculum for this institution.

In order to accomplish this purpose, the study attempted to answer six questions which were based on aptitude and achievement test scores of a sample group of students institutionalized at the school.

In attempting to answer these questions, the study determined the following:
1. Based on the scores attained on the General Aptitude Test Battery, the total group sample was found to be significantly below the average norms established by this instrument in aptitudes relating to intelligence, verbal, numerical, and clerical perception, and above average norms in manual dexterity and form perception.

2. Based on scores attained on the California Achievement Test, the total group sample was found to be retarded 3.7 years in achievement level, compared to norms established by this instrument.

3. Based on scores attained on the General Aptitude Test Battery, it was determined that the males who had been confined once were lower in finger and manual dexterity than the males confined twice or more, and lower in clerical perception and finger dexterity than the females confined twice or more. The females confined once were higher than the males confined twice or more in clerical perception, but lower than this male group in manual dexterity. There were no significant differences between the two female groups in aptitudes.

4. Occupational Aptitude Patterns were established from the General Aptitude Test Battery, and it was determined that 60 percent of the student sample group could qualify for seven of these Occupational Aptitude Patterns. These patterns and the percentages of students who qualify for them are as follows:

<table>
<thead>
<tr>
<th>Pattern</th>
<th>Percentage of Sample Group</th>
</tr>
</thead>
<tbody>
<tr>
<td>OAP-19</td>
<td>60%</td>
</tr>
<tr>
<td>OAP-20</td>
<td>60%</td>
</tr>
<tr>
<td>OAP-22</td>
<td>60%</td>
</tr>
<tr>
<td>OAP-28</td>
<td>80%</td>
</tr>
<tr>
<td>OAP-31</td>
<td>70%</td>
</tr>
</tbody>
</table>
OAP-32  70% of sample group  
OAP-35  60% of sample group

The jobs described within these seven Occupational Aptitude Patterns are semi or low skill positions.

5. It was determined that there was evidence to indicate that the California Achievement Test could effectively be used as a measure of achievement for this group, but because the sample group was so retarded in achievement level, there was some doubt expressed that the General Aptitude Test Battery, which is geared to a chronological age level, revealed meaningful potential aptitudes.

6. Based on established Occupational Aptitude Patterns and other extenuating factors, the type of vocational education curriculum which was suggested for the Utah State Industrial School was a general vocational curriculum with stress on vocational guidance and a well defined work experience program. The general vocational curriculum would be determined in the following manner: after careful examination of the job descriptions contained within the seven Occupational Aptitude Patterns for which 60 percent of the sample students qualify, those basic skills which are fundamental to many of the jobs should be clustered together in an area, enabling the student to gain an understanding of the general skills necessary for employment in this area.

Conclusions

The following general conclusions have been drawn based on the research and data presented in this study of aptitudes and achievement
levels of a sample group of students at the Utah State Industrial School in order to formulate guidelines for a vocational educational curriculum.

1. There is a need for vocational education programs for institutionalized youths.

2. Before vocational education programs are established, it is necessary to study the aptitudes and achievement levels of students to be served by these programs.

3. A general vocational curriculum would be the most practical type of vocational curriculum for the students confined at the Utah State Industrial School. This curriculum should be based on the fundamental skills found most often in the job descriptions within the seven Occupational Aptitude Patterns for which 60 percent of the student sample group qualify.

Recommendations

The following recommendations have resulted from this study of the aptitude and achievement levels of a sample group of students at the Utah State Industrial School.

Because the purpose of this study was to relate these aptitudes and achievement levels to a suggested type of curriculum, the majority of the recommendations concern the suggested curriculum. Although all of the recommendations are not directly related to aptitude and achievement levels, they have been arrived at as a result of the researchers' growing appreciation for the importance of a strong general vocational curriculum for these students, and the extenuating factors, some outside the scope of this study, which make planning this curriculum a difficult endeavor.
Therefore, it is recommended that:

1. Further study utilizing the General Aptitude Test Battery as a measure of aptitude for low achievers be pursued.

2. The General Aptitude Test Battery be administered to students age 15.5 to 18.5 entering the institution, and again when they are released. The initial test results would be used for placement, while the second testing could be used to re-evaluate aptitude levels and determine the results of participation in the vocational program. This testing would also be of some assistance in determining if the General Aptitude Test Battery aptitude levels could be raised in relation to the achievement levels, in order to determine if this test is a true measure of aptitudes for low level achievers.

3. A vocational guidance course be developed under the direction of the vocational guidance counselor. The purpose of this course would be to explore the world of work in general and to provide an opportunity for the students to become familiar with the qualifications and responsibilities of occupations in order to motivate the student to eventually pursue a realistic occupational choice. Such a course would also motivate the student to pursue some sort of advanced training upon release by providing an understanding and appreciation of education as a vital facet of employment.

4. Performance criteria be established for the general vocational curriculum content. This performance criteria would provide for more flexibility within the courses, and allow for individual student pacing, both factors of great importance within this limiting institutional circumstance.
5. Opportunity be provided for the students to participate in some work program. This could be in the form of a general work study program or a cooperative education program.

6. A vocational coordinator be employed to supervise the work programs while the student is confined to the school, and that this coordinator make follow-up studies to determine the effectiveness of the work experiences and adjust these programs to the results of this research.

7. An investigation be made into the possibility of providing short-term specific vocational courses in cooperation with industries seeking employees. This training would be geared to those students who are capable of advanced training, and would supplement the general vocational program. This training would be undertaken only if industry indicated a need for specific employees in order to assure placement upon completion of the training.

8. A local advisory committee be appointed to help plan the vocational curriculum. Selection should be made from among those people who would be most familiar with general vocational needs, and most aware of job opportunities in the area. Aside from the practical aspect of this committee, it would seem an excellent move to get those outside the institution interested and involved in the programs of the school.

9. The institution fully familiarize itself with and utilize the state agencies which can be of some assistance in this area. These would include agencies involved in vocational education and job opportunities. An awareness of national agencies is also recommended.
Summary

There seemed no more effective way to summarize this research than with this quotation from Kemp.

There is no magic formula for the solution of this problem; nor is it enough to replace rejection with concern. For socio-economically handicapped youth, the only reliable and lasting solution lies in education and training. It is from the strengths and support education can provide to each student that much of the motivation toward responsible citizenship will come . . . For those in vocational programs, the recognition of each individual student's worth and potential and the attempt to meet his needs are major contributions. The prime requisites are imagination, initiative, courage, and the willingness to begin. (Kemp, 1966, p. 46)
LITERATURE CITED


APPENDIXES
UTAH STATE INDUSTRIAL SCHOOL (Study by Dr. Sowles)
Intelligence Date: 1955-1966

<table>
<thead>
<tr>
<th>Classification Range</th>
<th>Full Scale I.Q.</th>
<th>Verbal I.Q.</th>
<th>Performance I.Q.</th>
<th>Normal Population Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Number</td>
<td>Percent</td>
<td>Number</td>
<td>Percent</td>
</tr>
<tr>
<td>Very Superior</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>140-149</td>
<td>1</td>
<td>.3</td>
<td>1</td>
<td>.1</td>
</tr>
<tr>
<td>130-139</td>
<td>8</td>
<td>.9</td>
<td>3</td>
<td>.6</td>
</tr>
<tr>
<td>Superior</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>120-129</td>
<td>.68</td>
<td>2.3</td>
<td>58</td>
<td>2.2</td>
</tr>
<tr>
<td>Bright Normal</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>110-119</td>
<td>203</td>
<td>7.2</td>
<td>155</td>
<td>5.9</td>
</tr>
<tr>
<td>Average</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>100-109</td>
<td>555</td>
<td>48.2</td>
<td>388</td>
<td>40.0</td>
</tr>
<tr>
<td>90-99</td>
<td>759</td>
<td>66.1</td>
<td>743</td>
<td>50.0</td>
</tr>
<tr>
<td>Dull Normal</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>80-89</td>
<td>666</td>
<td>24.0</td>
<td>675</td>
<td>25.6</td>
</tr>
<tr>
<td>Borderline</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>70-79</td>
<td>365</td>
<td>13.0</td>
<td>454</td>
<td>17.2</td>
</tr>
<tr>
<td>Mental Deficiency</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>60-69</td>
<td>112</td>
<td>5.0</td>
<td>194</td>
<td>9.0</td>
</tr>
<tr>
<td>50-59</td>
<td>27</td>
<td>1.1</td>
<td>38</td>
<td>1.1</td>
</tr>
<tr>
<td>40-49</td>
<td>1</td>
<td>.01</td>
<td>1</td>
<td>.01</td>
</tr>
<tr>
<td>30-39</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>2765</td>
<td>92.80</td>
<td>2629</td>
<td>89.16</td>
</tr>
</tbody>
</table>

Mean: 92.80, 89.16, 97.62
# Appendix B

## PERCENTILE EQUIVALENTS OF APTITUDE OR STANDARD SCORES

### Table II

Projected Percentile Equivalents of 10th-Grade Aptitude or Standard Scores
(Based on GATB Longitudinal Maturation Study)

<table>
<thead>
<tr>
<th>10th grade aptitude scores</th>
<th>G</th>
<th>V</th>
<th>N</th>
<th>S</th>
<th>P</th>
<th>Q</th>
<th>X</th>
<th>F</th>
<th>M</th>
</tr>
</thead>
<tbody>
<tr>
<td>140</td>
<td>99</td>
<td>99</td>
<td>99</td>
<td>98</td>
<td>98</td>
<td>99</td>
<td>99</td>
<td>99</td>
<td>99</td>
</tr>
<tr>
<td>135</td>
<td>98</td>
<td>98</td>
<td>98</td>
<td>97</td>
<td>96</td>
<td>98</td>
<td>98</td>
<td>98</td>
<td>98</td>
</tr>
<tr>
<td>130</td>
<td>96</td>
<td>96</td>
<td>96</td>
<td>95</td>
<td>94</td>
<td>96</td>
<td>97</td>
<td>96</td>
<td>96</td>
</tr>
<tr>
<td>125</td>
<td>93</td>
<td>94</td>
<td>94</td>
<td>91</td>
<td>90</td>
<td>93</td>
<td>95</td>
<td>94</td>
<td>94</td>
</tr>
<tr>
<td>120</td>
<td>88</td>
<td>89</td>
<td>90</td>
<td>86</td>
<td>85</td>
<td>89</td>
<td>91</td>
<td>90</td>
<td>90</td>
</tr>
<tr>
<td>115</td>
<td>83</td>
<td>84</td>
<td>85</td>
<td>80</td>
<td>80</td>
<td>84</td>
<td>86</td>
<td>84</td>
<td>85</td>
</tr>
<tr>
<td>110</td>
<td>76</td>
<td>76</td>
<td>79</td>
<td>73</td>
<td>73</td>
<td>76</td>
<td>80</td>
<td>77</td>
<td>79</td>
</tr>
<tr>
<td>105</td>
<td>67</td>
<td>67</td>
<td>71</td>
<td>62</td>
<td>64</td>
<td>67</td>
<td>73</td>
<td>69</td>
<td>71</td>
</tr>
<tr>
<td>100</td>
<td>58</td>
<td>58</td>
<td>62</td>
<td>52</td>
<td>56</td>
<td>58</td>
<td>64</td>
<td>60</td>
<td>62</td>
</tr>
<tr>
<td>95</td>
<td>48</td>
<td>46</td>
<td>50</td>
<td>42</td>
<td>46</td>
<td>48</td>
<td>52</td>
<td>50</td>
<td>52</td>
</tr>
<tr>
<td>90</td>
<td>38</td>
<td>36</td>
<td>40</td>
<td>33</td>
<td>36</td>
<td>38</td>
<td>42</td>
<td>40</td>
<td>42</td>
</tr>
<tr>
<td>85</td>
<td>29</td>
<td>26</td>
<td>31</td>
<td>24</td>
<td>29</td>
<td>27</td>
<td>33</td>
<td>31</td>
<td>33</td>
</tr>
<tr>
<td>80</td>
<td>21</td>
<td>18</td>
<td>23</td>
<td>16</td>
<td>21</td>
<td>20</td>
<td>24</td>
<td>23</td>
<td>24</td>
</tr>
<tr>
<td>75</td>
<td>15</td>
<td>12</td>
<td>16</td>
<td>11</td>
<td>15</td>
<td>14</td>
<td>17</td>
<td>16</td>
<td>17</td>
</tr>
<tr>
<td>70</td>
<td>10</td>
<td>7</td>
<td>11</td>
<td>7</td>
<td>11</td>
<td>9</td>
<td>12</td>
<td>11</td>
<td>12</td>
</tr>
<tr>
<td>65</td>
<td>6</td>
<td>4</td>
<td>7</td>
<td>4</td>
<td>7</td>
<td>5</td>
<td>7</td>
<td>7</td>
<td>7</td>
</tr>
<tr>
<td>55</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>3</td>
<td>2</td>
<td>3</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>50</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>45</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>

*These percentile equivalents for 10th-grade students are derived from the distribution of adult-level scores which the students could be expected to make as 12th-graders.
## Appendix C

**MANUAL FOR THE GATE, SECTION II**

Table I

Adult Aptitude or Standard Scores and Corresponding Percentiles

<table>
<thead>
<tr>
<th>Adult aptitude or standard score</th>
<th>Percentile</th>
</tr>
</thead>
<tbody>
<tr>
<td>145</td>
<td>99</td>
</tr>
<tr>
<td>140</td>
<td>98</td>
</tr>
<tr>
<td>135</td>
<td>96</td>
</tr>
<tr>
<td>130</td>
<td>93</td>
</tr>
<tr>
<td>125</td>
<td>89</td>
</tr>
<tr>
<td>120</td>
<td>84</td>
</tr>
<tr>
<td>115</td>
<td>77</td>
</tr>
<tr>
<td>110</td>
<td>69</td>
</tr>
<tr>
<td>105</td>
<td>60</td>
</tr>
<tr>
<td>100</td>
<td>50</td>
</tr>
<tr>
<td>95</td>
<td>40</td>
</tr>
<tr>
<td>90</td>
<td>31</td>
</tr>
<tr>
<td>85</td>
<td>23</td>
</tr>
<tr>
<td>80</td>
<td>16</td>
</tr>
<tr>
<td>75</td>
<td>11</td>
</tr>
<tr>
<td>70</td>
<td>7</td>
</tr>
<tr>
<td>65</td>
<td>4</td>
</tr>
<tr>
<td>60</td>
<td>2</td>
</tr>
<tr>
<td>55</td>
<td>1</td>
</tr>
</tbody>
</table>
VITA

James Richard Heggen

Candidate for the Degree of

Doctor of Education

Dissertation: A Study of Aptitudes and Achievement of Students Confined at the Utah State Industrial School for the Purpose of Determining Occupational Aptitude Patterns to be Used as Guidelines for Formulating a Vocational Education Curriculum

Major Field: Industrial Education

Biographical Information:

Personal Data: Born in Eau Claire, Wisconsin, March 11, 1931, son of Kenneth and Ruby Heggen; married Joan Reidy, 1955; three children—Sara Jo, Jeffrey, and Jon.

Education: Attended elementary school in Eau Claire, Wisconsin; graduated from Eau Claire Senior High School in 1949, received a Bachelor of Science degree in Industrial Education from Stout State University, Menomonie, Wisconsin in 1958; received a Master of Science degree in Industrial Education from Stout State University in 1959; completed requirements for a Doctor of Education degree in Industrial and Technical Education, with supporting areas of Educational Administration and Curriculum Development at Utah State University in 1968.

Professional Experience: 1967 to present, Assistant Professor of Industrial and Technical Education, Utah State University; 1965-67, graduate study and instructor at Utah State University; 1964-65, participant in the American Industry Curriculum Project, Stout State University; 1964-65, Coordinator of Wisconsin Vocational Pilot Project for Menomonie Public Schools; 1960-65, Supervisor of Industrial Education for Menomonie Public Schools, Menomonie, Wisconsin, (supervised on-campus cadet teachers from Stout State University); 1959-60, teacher of Industrial Arts at Wausau Senior High, Wausau, Wisconsin.