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DISSertation

Presented in Partial Fulfillment
of the Requirements for the Degree
Doctor of Philosophy in the Graduate
School of The Ohio State University

By

Larry Wayne Browder, B.S., M.S.

* * * * * *

The Ohio State University
1972

Approved by

Advisor
Industrial Technology Education
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CHAPTER I

INTRODUCTION

Innovative approaches to the study of industrial arts have been developed, within the last decade, because of dissatisfaction with traditional curriculum (Hauenstein, 1966). High priorities in these developmental activities were the conceptualization of technological concepts and generation of effective instructional systems.

These new curriculums must be evaluated in terms of their stated objectives. In other words, if one of their objectives is to impart knowledge of industrial technology, it is necessary to measure the degree to which the instructional systems facilitate student achievement in that subject matter.

Achievement is often measured only during or upon completion of a course, but it also has a longitudinal dimension. A necessary component of curriculum evaluation should be feedback from studies as to their long-range effects upon learners.

The Industrial Arts Curriculum Project (IACP), funded by the United States Office of Education, was an
innovative curriculum development effort by a group of teacher educators from The Ohio State University in cooperation with teacher educators from the University of Illinois. The IACP-produced instructional system introduces junior high school students to modern industrial technology and provides a more relevant orientation to our technological society than does traditional instruction (Buffer, Lux, and Ray, 1971). The IACP, initiated in 1965 and terminated in August, 1971, developed two one-year courses, "The World of Construction" and "The World of Manufacturing". Included in the development was a thorough scheme for the evaluation of program impact upon students at the time they were in the program, but significant longitudinal evaluation has not been undertaken.

**Purpose of Study**

The purpose of this study was to investigate the impact of the WOC program upon: achievement of construction technological concepts after a period of time, evolving interests in construction, subsequent industrial arts course choices, and academic success in these classes. The evaluation of IACP products to date has been primarily of a formative nature. It has consisted of evaluation of
students' achievement via course achievement tests and data from questionnaires which were distributed to parents, teachers, and administrators during or upon completion of instruction. Evaluation of the instructional program by field evaluation center directors and teachers was found to be important to the developmental phase of the IACP program (Dugger, 1970, p. 2). Feedback was then used principally to revise the program materials which, in due course, affect student achievement. (See Appendix C) The proposed problem has not been investigated.

**Problem Statement**

The problem of this investigation was to determine what effect experiences in the World of Construction (WOC) course taken in the seventh grade have had on a sample of the same students surveyed four years later. The data were analyzed for achievement of construction technological concepts, level or degree of interests in construction technology, choices of industrial arts courses made during the intervening eighth through eleventh grades, and of grades received in these courses. Such an investigation now can be undertaken, and the students who completed the IACP "The World of Construction" course in 1967-68 have been selected for this investigation because
the instruction they received:

1. purports to deal with a major portion of industrial technology,
2. was based upon a conceptualized and structured body of knowledge and curriculum materials within an organized instructional system,
3. led to the development of commercially-available instructional materials, and
4. was given five school years ago.

Significance of Study

The efficacy of WOC, at the time of course completion, has been well documented, but the value after a time interval has not been investigated. The significance of this study lies in its determining the efficacy of the WOC instructional system in achieving stated purposes four years after students have completed it.

The success or failure of this course to impart knowledge of and to affect attitudes about construction technology, which have an enduring value, should be ascertained. The results may be of value in determining the need for revisions in the instructional system or in its grade placement.
Objectives

The specific objectives of the proposed study were:

1. To compare performance of 1967-68 WOC students on the World of Construction Comprehensive Achievement Examination I four years after completion of the course.

2. To compare the 1967-68 WOC and TIA student performance on the Construction Industry Interest Inventory instrument four years from completion of the course.

3. To compare 1967-68 WOC and TIA students' selection of additional industrial arts courses from 1968 to 1972.

4. To compare 1967-68 WOC and TIA students' academic performance (grade point average) in additional industrial arts courses from 1968 to 1972.

Assumptions

For this research, the following assumptions were made:

1. The World of Construction Comprehensive Achievement Examination I is a reliable and valid instrument.

2. The Construction Industry Interest Inventory is a reliable and valid instrument.

3. The concepts of industrial technology should be emphasized in the industrial arts curriculum in liberal education programs in junior high schools throughout the United States.

4. Students were randomly assigned to WOC and TIA classes within respective junior high schools in 1967-68 in the Cincinnati Public Schools.

5. Matching students from both innovative and traditional program groups from within the same junior high schools would assist in providing a compara-
tive basis for judging WOC student performance.

6. The students in both groups being studied were given a comparable quality and amount of instruction and opportunities to make academic choices throughout the 1967-1972 period.

7. All demographic data and cumulative records collected from each school were reliable and valid.

8. Evidence of the possible contributions of a single course within a total educational program, despite its limitations, is better than no evidence at all.

Limitations and Constraints

This study was completed within the following limitations:

1. There is a lack of agreement on the composition of a "traditional" industrial arts course. Thus, the traditional course in this study may not be representative of the type.

2. Initial teacher and pupil interest in WOC, as something new and different, alone could influence the test results.

3. The comprehensive achievement test utilized in this study was developed during the first year usage of WOC. Several revisions of this test were made throughout the duration of program development. Consequently, the original achievement test was not considered to be as qualitative as revised editions.

4. The effect of a single course, in a pattern of approximately thirty courses over a period of five years of study, may be due to interrelationships among and between courses within the total pattern rather than a direct result of particular courses.
5. The relationship of the criterion measures to the experiences in a single course may have been seriously weakened because of the influence of non-school experiences in the five-year period of the study.

Definitions of Terms

The following definitions were used in this study:

Achievement - accomplishment or proficiency of performance in a given skill or body of knowledge.

CIII - acronym for the Construction Industry Interest Inventory instrument.

Construction Technology - that part of industrial technology which includes the management, production, and personnel knowledge of the system (construction) that produces material goods which are relatively permanently affixed to a site.

IACP - acronym for the Industrial Arts Curriculum Project; a curriculum research and development project which produced an innovative instructional system which was designed to teach the concepts of industrial technology via the study of construction and manufacturing technologies.

Industrial Technology - the knowledge of industrial practice.

Interest - any preference displayed when choices are available.
Technology - the knowledge of practice.

TIA - acronym for traditional industrial arts program; studies which emphasize knowledge and skill related principally to drawing, metalworking, and woodworking.

WOC - acronym for the World of Construction industrial arts course.

WOCCAEI - acronym for the World of Construction Comprehensive Achievement Examination I.

Procedures of Study

The following procedures were utilized in this study.*

1. The seventh grade 1967-68 WOC and TIA populations were identified in the following Cincinnati, Ohio junior high schools - Walnut Hills, Dater, Cutter, and Gamble.

2. A random sample of 100 students, fifty WOC and fifty TIA, were selected in 1972 from the following Cincinnati, Ohio secondary schools - Walnut Hills, Western Hills, and Hughes - to represent the total 1967-68 populations.

3. Orientation of all students to purpose and utilization of this study.

4. Administration of the WOCCAEI and CIII to participating students in both groups.

5. Investigation of cumulative educational records of all students in both WOC and TIA groups to reveal the number of industrial arts courses taken from 1968 to 1972 along with the grade point average of these courses.

6. A t-test for related samples and one-way analysis of variance statistical techniques were utilized.
to test the five hypotheses.
*For a more detailed description of the procedures of the study see Figure 1, page 41.

Summary

Chapter I presents a problem statement and the purpose and significance of this research. Also included are the assumptions, limitations, definitions of terms, and procedures of the study which help orient the reader to this dissertation.

Chapter II pertains to a search of relevant literature from the early nineteen hundreds to the present date. Various studies and researches also are reported in this chapter.

Delineation of the design of the study will be presented in Chapter III. Chapter IV presents the findings. Conclusions and recommendations are detailed in Chapter V.
CHAPTER II

REVIEW OF RELATED RESEARCH

The purpose of this chapter was to summarize the literature relating to retention of knowledge, permanence of learning, and interests as they apply to this five-year follow-up study of student achievement. Materials were reviewed as follows:

1. Studies involved with the general nature of retention of knowledge including literature relating to the differentiation of learning between nonsense syllables and meaningful materials.

2. Research measuring retention, achievement, and permanence of learning for extended periods of time.

3. Educational investigations related to the nature of interest and interest inventories.

Studies Involved With Retention of Learned Information

The human mind gathers data through the senses, forms concepts, and stores both sense data and concepts, recalling them from time to time. Measurement cannot give a
completely adequate description of what the mind retains. The notion that one picks up only those ideas which are revealed by an examination seems to have been refuted by evidence of pathological conditions in which the patient phenomenally recalls, under stress of high fever or during hypnosis, learning that cannot be recalled by testing (Moore, 1939, p. 413). These conditions, together with other more common evidence of learning beyond the power of recall, lead us to accept the theory that the human memory is not a reservoir of inactive information, but rather an active power of the mind.

Since it is impossible to have a complete measurement of all that the mind retains, we consider experiments in which the various elements of results of learning are explored, measuring these elements accurately, but specifying exactly what it is that is measured. "Retention" has been variously defined from the "ability to retain one's own experiences" (Green, 1936, p. 10) to "a trace in the form of a functional trend in the nervous system" (Kingsly, 1946, p. 454). Carter V. Good (1959, p. 468) defines retention as "the results of an excitation, experience, or response occurring as a persisting after effect, that may serve as the basis for future
modification of response or experience and regarded as one of the necessary factors in the determination of habit formation and memory". Yet the very diversity of any definition given to retention, as well as the variety of methods used to study it, attests that it is a very complex human activity. Because of this complexity, each study of retention must be carefully done, and the conclusions wisely drawn.

Another facet of retention is forgetting, which seems to be an extension of the learning process rather than a fading out of learning. The nature of forgetting has received little investigation possibly because the long acceptance of the Ebbinghaus (1913) conclusion that disuse is accountable for the decrement. The assumption that forgetting is the result of disuse has been effectively refuted by the discovery that during periods of disuse the retention curve has been found to rise, and conversely, that forgetting occurs even during use and practice (Luh, 1922, p. 63). Another point of view of the nature of forgetting suggests that the drop in retention is caused by a deterioration of some kind that takes place in the nervous system (Finkenbinder, 1913, p. 24). This consideration, too, has not been able to be proven
by experiments, and has in fact been opposed by investigation into the effects of motivation, environment, and intervening activity between the learning and the retention test.

Subsequently, when measuring retention, there must be consideration of learning and forgetting. Each method of application of retention evaluation procedures will vary as to the amount of pure retention measured and as a result it is necessary to name the method and material used when discussing the amount of retention found (Davis and Moore, 1935, p. 144). This is particularly true in the different retention results between substance material and nonsense syllables performed by Briggs and Leslie (1943, p. 513); in contrast to the "percentage of retention" where the percentage refers to time saved in relearning in some methods and subject matter recalled in others. Likewise, it is necessary to keep in mind the fact that tests of retention do not actually measure all that has been learned. Not only are items of previous knowledge mixed in, but also the learned content is affected by the interval between learning and testing during which the phenomena of reminiscence and inhibition are taking place (Raskill, 1970, p. 191).
Ebbinghaus (1913, p. 65), an innovator in applying the experimental method to the "higher thought process", is credited with being the first to perform any experimental study of memory. Using himself as the subject of the experiment, he studied retention by the savings method. He reported his findings in terms of percentage of time, rather than of amount retained: a fact that makes it impossible to compare his curve of retention with those based upon amount of subject matter retained.

In general, the conclusions of those who studied retention by the time savings method using nonsense syllables or rote material, agreed that retention dropped off greatly in the first few hours after the original learning. The results of the Ebbinghaus study are shown in Table 1.
Table I

EBBINGHAUS TIME SAVING METHOD STUDY*

<table>
<thead>
<tr>
<th>Interval</th>
<th>Mean Saving %</th>
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<td>½ hour</td>
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</tr>
<tr>
<td>1 hour</td>
<td>44.2</td>
</tr>
<tr>
<td>8-9 hours</td>
<td>35.8</td>
</tr>
<tr>
<td>24 hours</td>
<td>33.7</td>
</tr>
<tr>
<td>2 days</td>
<td>27.8</td>
</tr>
<tr>
<td>6 days</td>
<td>25.4</td>
</tr>
<tr>
<td>31 days</td>
<td>21.4</td>
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</tbody>
</table>

*Ebbinghaus (1913, p. 110)
Conclusions similar to those of Ebbinghaus were found by Finkenbinder (1913, p. 8), Luh (1922, p. 87), Van Omer (1932, p. 137), and Jenkins and Dallenback (1924, p. 606), with equivalent methods and materials which may be outlined as follows:

a) retention decreases with time,

b) forgetting is more rapid at first, and

c) the curve of retention is generally uniform.

For retention to be studied under real life situations, it is necessary to consider the importance of meaningful materials. English, Welborn, and Kilian (1934, p. 235) and Briggs and Reed (1934, p. 513) have shown that the use of verbatim material without reference to its meaningfulness did not differ from the Ebbinghaus curve, while the use of substance material that was non-verbatim indicated small loss in retention. The more meaningful the materials are, the better measure we have of the nature of retention and forgetting under non-artificial conditions. Dowling (1957, p. 213) and Welborn and English (1937, p. 233) indicated that the amount of research that has been done with such materials has been limited; some deal with the variation in teaching technique of motivation and strategies while others involve
more controlled conditions. Green (1931), after readministering an examination in October that several university students had taken in June, found a loss of about one-half of the content in the four month period. This study does not regulate the strong possibility of the more concentrated setting in the June administration. Bassett (1929, pp. 683-690) found that large amounts of well-taught history were retained up to sixteen months after teaching. Data collected by Jones (1963, p. 68) of lectures in college psychology revealed a great loss of retention after eight weeks.

In summary, some factors of retention have become established; others are unresolved and open to controversy. The measurement of retention is affected by (1) method of measurement, (2) motivation of the subject being tested, (3) previous knowledge of the subject matter, (4) type of activity intervening between the learning and the retention test, and (5) number of tests repeated. Also included is the affective tone of the material, the amount of information learned, the degree of learning and the setting of the environment of subject at the time of both learning and testing. Lastly, studies of abnormal conditions prove that more is retained than is brought
to light in experimental testing. All of the previously mentioned items were considered in the development of this follow-up study.

**Permanence of Learning, Achievement and Retention**

Several studies have indicated that when learning goals—such as facts, generalizations, interpretations, or applications have been reached—permanence of learning occurs. Studies of this kind were made by Tyler (1953) and Wert (1937). Tyler measured five objectives in a test administered to zoology students. He tested the students at the beginning of the course, at the conclusion of the course, and fifteen months after completion of the course. The knowledge gain or loss was recorded after the fifteen month period and compared to the amount gained during the course. Data revealed an eighty percent loss from the recall of facts, a seventy-two percent loss from the recognition of technical terms, a twenty-two percent loss from the identification of organs from pictures, a one-hundred twenty-six percent gain from the interpretation of new experiments, and a zero gain or loss from the application of principles. Wert also measured the percent of gain or
loss in teaching objectives in zoology. He computed the amount of gain or loss during a three year period in relation to amount gained during a zoology course. He found more than an eighty percent loss in the association of names with structures, a fifty plus percent loss in the remembrance of terminology, a twenty percent gain in the interpretation of new experiments, and a sixty percent gain in the application of principles to new situations.

Willis Ray (1957) performed a study with ninth grade boys utilizing an informational and manipulative unit on the vernier micrometer via two teaching methods: (1) traditional direct and detailed instruction and (2) directed discovery, which provided opportunities for solving problems. The two treatments were equally effective when measured on tests of initial learning and retention after one week. However, the results of a retention test administered six weeks after instruction favored the group which had learned via the directed discovery method.

In his longitudinal study, Flis (1969) indicated that the theory that factual knowledge was forgotten whereas generalizational knowledge, interpretational ability, and
application ability were increased with the passage of time was the basis of the achievement evaluation used in the study. He also indicated that application ability, because of its lasting character, should be emphasized in the teaching of all subjects as opposed to emphasizing factual and generalizational knowledge in that teaching.

Gagne' and Bassler (1963) performed similar research to the previously mentioned studies since the instruction of their innovative program was based upon learning hierarchies and generalizational knowledge. Even though achievement on geometric concepts was less than mastery (50.2% on first administration for five different groups), retention after nine weeks was approximately the same (50.3%). However, four of the five groups actually had retention ratios ranging from 108% to 126% while the fifth group fell to 75%. The authors attributed the gain in scores to a well developed relevant instructional program. Nevertheless, the previously mentioned scores do constitute good evidence that this kind of material, when learned by means of a carefully constructed instructional program, is highly resistant to forgetting (Gagne' and Bassler, 1963, pp. 123-132).

Statistical analysis was conducted by comparing the experimental group with the control group. The t-test
and analysis of variance statistical procedures were used where appropriate.

On the other hand the Office of Economic Opportunity (OEO) performed a rather extensive experiment comparing performance contracting and traditional classroom instruction in improving the reading and mathematics skills of poor children. It was found that no significant difference existed between the two groups.

One of the major problems this study did not control for was the John Henry effect. The John Henry effect is similar to, but should not be confused with, the Hawthorne effect. The Hawthorne effect reflects the impact of experimental conditions upon the experimental groups' performance. "The John Henry effect, on the other hand, reflects the impact upon a control group in an experiment where the experimental group is perceived as competing and/or threatening to surpass or replace the control group" (Saretsky, 1972, p. 579). It was also indicated that teachers of the control group students made every attempt to outperform the innovative group teachers.

Another decrement to the "no significant difference" in this study could have been the measurement instrument utilized. "The standardized achievement tests used may not measure gains made through specific programs, and because of their psychometric properties the tests may
indicate gains in excess of or less than gains actually achieved" (Saretsky, 1972, p. 580).

In summary, because of its retention characteristic, the ability to apply facts and principles in practical situations, should be emphasized in teaching educational subject matter as opposed to emphasizing knowledge of facts, generalizations, and ability to interpret. These experiments provide evidence that unrelated facts and information are temporarily learned. Whereas achievement of problem solving processes of interpretation and application is advocated by the innovative curricula. Finally, in studies where no significant differences are found, it might be advisable to investigate for prevalence of the John Henry effect.

The Eight Year Study

The Eight Year Study initiated in 1932 is one of the classical follow-up studies in our educational history. The devastating impact of this study has much relevance to today's educational needs. Several of the people primarily responsible for the Eight Year Study were Aiken, Buros, Raths, Taba, Alberty, Traxler, French, Corey, Ryan, McKenzie, Harap, and Tyler; a dedicated group of educational leaders in the United States.
Thirty secondary schools were selected throughout the United States to demonstrate fully the effects of a variety of programs of instruction planned and initiated to emphasize many different avenues of study and experiences which could result in satisfactory achievement at the college level and relate to the American way of life.

Two major principles guided the administrators and teachers in their efforts at curriculum reconstruction.

The first principle was that the general life of the school and methods of teaching school conform to what is known about the ways in which human beings learn and grow.

The second major principle which guided the work of the participating schools was that the high schools of the United States should rediscover their chief reasons for existence (Adventure in American Education, 1942, p. 18).

World War II interrupted this massive study in the early 1940's so consequently we have not been able to witness the full impact of the first comprehensive reconstruction of the secondary school. A follow-up study conducted by Chamberlain, Drought and Scott (1942) attempted to determine how well the graduates of the selected thirty schools did in college. It was found
that these individuals performed as well as members of a comparison group in every measure of scholastic competence. In the many aspects of development considered more valuable than marks, they did better. The further a school departed from the traditional college preparatory program, the better was the record of the graduates.

In conclusion, the Eight Year Study questioned the assumption that a strict subject centered curriculum was the only educational method to prepare our youth for college and life functions. Program diversity and flexibility provided a viable alternative in preparing youth for important life functions.

**Nature of Interest**

Just what constitutes the ultimate nature of interest is not well understood. It is as complicated to analyze as are the many other qualities which compose what is generally called character.

The development of interests in any person has been found to be the result of the individual's learnings. Strong (1943, p. 10) stated, "Since interests involve
reactions to specific things, they must all be learned. Accordingly, they may be modified later on by re-education.

Strong (1943, p. 6) concludes that, "Experimentally an interest is a response of liking; an aversion is a response of disliking". He also writes that in filling out an interest inventory one indicates whether he likes, is indifferent to, or dislikes an item. In all measurement of interests, it is assumed that one of these three responses can be selected to each item and among a group of people all responses will be utilized to each item.

Super (1949, pp. 449-456) implies that an adequate theory of interest must build on the findings concerning the relationship between general aptitude and interest. Interests are the product of interaction between inherited aptitudes and endocrine factors on the one hand, and opportunity and social evaluation on the other.

Fryer (1931, p. 346) indicates that objective interests are acceptance reactions and objective aversions are rejection reactors. As a result, the acceptance (turning toward) and rejection (turning away from) stimulation may be correlated with pleasant or unpleasant experiences.
Thorndike (1935) concluded that interests must be learned since they involve reaction to specific stimuli and that a person has the ability to perform what is to become interesting. He also states:

The results of our experiments support the conclusion that a person can be taught new attitudes and tastes as surely though not as easily as he can be taught facts or skills. The basic principles of learning by repetition and reward seem to operate with wants, interests, and attitudes as they do with ideas and movement (p. 165).

The rise of the interest concept has become quite commonplace, and a prerequisite statement of interests has often been required of many persons before the doors to the activities they seek are opened.

A question about interests is the opening gambit in any interview. Counselors, teachers, and parents often expect a student to declare, "I'm interested..." before he may feel free to pursue his goal. It is worth noting too, that in counseling with students, interest usually is perceived to exist prior to meaningful experience in activity. Whereas in many other kinds of human endeavor interest is considered to be a likely consequence or by-product of experience (Gerber, 1964, p. 280).

When any function associated with an object enables the individual to satisfy his desire, the activity tends to be liked - thus, a new interest in acquired which is
referred to as "conditioning" by Tuttle (1940). Tuttle also concludes that interests can be learned and that occupational-interest patterns are well established in many children by the age of fifteen years. Flanagan (1944) advocates that interests are shown in activity to the extent to which an individual selects these activities in preference to others in a free choice situation.

Dewey (1913) defines interest in the following manner:

Interest is not some one thing; it is a name for the fact that a course of action, an occupation or pursuit absorbs the powers of an individual in a thoroughgoing way (p.65).

He adds that genuine interest is the principle of the recognized identity of the fact to be learned or the action proposed with the growing self. Also he implies that it lies in the direction of the agent's own growth and is therefore imperiously considered if the agent is to be himself.

In summary, there is no set theory to explain the nature of interests. Interest definitions are varied and not succinct. Other factors such as attitudes, intelligence, environment, personal experience, and personality traits effect and contribute to interest development.
Career Interest Measurement

Measurement of career interests necessitates the testing of reality for that person. To determine the relative degree of reality for any given individual it is essential to obtain information from that person. Three ways of relating this to an observer are through verbal expression, physical action, and paper and pencil instruments. The first two of these categories have been classified as expressed interests while the third, in which we are primarily interested, has been classified in the measured form as inventory interests (Holland and Lutz, 1968, p. 428, and Super and Crites, 1962, pp. 377-380).

The expressions of interest are part of an interest developmental sequence for the young person that are later coupled with job commitment. This commitment is expressed by physical pursuit such as training and (or) actual employment. During this time, the individual's actions and expressions of interest become more compatible (Gerkin, 1964, p. 280).

The vocational interests of an individual can be compared to the interest of individuals in given professions through the use of interest inventories. Vocational
interest inventories have been in use for a number of years and several instruments have been developed. Some of these are the Kuder Occupational Interest Inventory (KOII), the Minnesota Vocational Interest Inventory (MVII), the Strong Vocational Interest Blank (SVIB), and the Construction Industry Interest Inventory (CIII) developed by Darius Young at The Ohio State University. The Strong Vocational Interest Blank (SVIB) has been designed for use with college students seeking professional occupation (Super and Crites, 1962, p. 419). The related research using the SVIB has been extensive and offers well founded data for comparative analyses in further studies (Super and Crites, 1962, p. 417).

The SVIB compares the interests of persons who are successful in a given occupation to the interests of the respondent to the same questions. The SVIB has been used by counselors for a number of years in assisting individuals as they make vocational choices (Campbell, 1969, p. 1).

**Inventoried Interest** - The use of inventories for exploration of an individual's interest started early in the twentieth century. Miner of Carnegie Institute made public his *Analysis of Vocational Tendencies* blank (Miner, 1922, pp. 311-323). This early blank was a written expression of the student's interests with no attempt made
to develop weighted scoring for the items at that time (Strong, 1943, p.42). The development of weighted scoring for the items was pioneered by Karl Cowdery and followed by the extensive work of E.K. Strong (Borow, 1964, p.52).

Strong altered his instrument in 1938. This revision introduced the basic style that is still in use today, although there have been at least two major alterations since that time. At the time Strong was revising the SVIB in 1938, the Kuder Preference Record (KPR) was being published after a number of years of background research. The mass use of the SVIB and the KPR by counselors brought the concept of inventoried interests to the forefront during World War II.

Super and Crites (1962) state:

Inventoried interest is assessed by means of lists of activities and occupations which bear a superficial resemblance to some questionnaires for the study of expressed interests, for each item in the list is responded to with an expression of preference. The essential and all-important difference is that in the case of the inventory each possible response is given an experimentally determined weight, and the weights corresponding to the answers given by the person completing the inventory are added in order to yield a
score which represents, not a single subjective estimate as in the case of expressed interests, but a pattern of interests which research has shown to be rather stable (p. 380).

Attempts have been made to compare the SVIB and KPR with some of the more recent inventories such as the Vocational Preference Inventory written by Holland and the Minnesota Vocational Interest Inventory (Super and Crites, 1962). Since both the KPR and the SVIB have undergone extensive revisions, only relatively recent comparative studies were considered. One such study published by Zytowski (1968) correlated the new KPR (which is now called the Occupational Interest Survey), the MVII, and the SVIB. Zytowski pointed out that, though the three instruments used the same title for given scales, the norm groups were often quite different. The study found that agreement of 56 of 68 correlations tested exceeded the correlation by chance at the .05 level. The author concluded that though the instruments purportedly were measuring the same thing, the difference in the basic methods of analyses and norm groups did not lead to high correlational agreement for any given scale tested by the respective instrument (pp. 44-49).
The CIII, developed by Darius Young at The Ohio State University in 1968, was selected for this study. It was utilized because it was an interest inventory instrument specifically related to construction industry technology. (See Appendix D)

This interest inventory contains 131 item phrases which relate to three distinct areas of construction technology. These three areas are: (1) construction management practices, (2) construction production practices, and (3) construction personnel practices. In totality, all of these areas, responded to by students, provide a reflection of student interest in construction technology. The CIII has a Kuder-Richardson reliability of 0.910 and an Odd-Even split half reliability of 0.910.

Reeser (1971) utilized the CIII to determine whether selected media had any effect upon student interest in the construction industry. He concluded that various selected media did not have a positive differential effect upon student interest in the construction industry.

Written permission was granted by Dr. Young to utilize the copyrighted Construction Industry Interest Inventory in this study.
Chapter Summary

This chapter summarized literature relating to achievement, retention of learning, permanence of learning, nature of interest, and interest measuring devices. The reviewed literature indicated that innovative and more relevant curricula, as opposed to traditional curricula, appeared to be advantageous to the retention and achievement of student learning.

Measurement of retention is affected by the method of measurement, motivation of subject being tested, previous knowledge of subject matter, time and activity of interim period, and number of repeated tests.

Facts are quickly forgotten whereas generalizational knowledge, interpretational ability, and applicational ability are increased with the passage of time. The innovative programs seem to place a greater emphasis on the latter abilities with a variety of educational techniques, in order to stimulate student interest. It was found that emphasis in teaching should be placed on generalization, applicability, and meaningful educational material for a more thorough understanding of subject...
matter if permanence of learning and achievement is to be considered. The Eight Year Study is a good example of the previous statement.

In this review of literature it was found that an interest is not a separate psychological entity but merely one of several aspects of behavior. Interest is a response of liking, can be "conditionally" learned, and is correlated with pleasant or unpleasant experiences. The nature of interest is complex and diverse and no one meaning or definition seems to be completely adequate. Many definitions and interpretations support this philosophy of the complexity of interest. This information assisted the researcher in understanding the many facets of the nature of interest and selection of the most pertinent interest inventory.

A number of interest measuring devices have been reviewed in this chapter. The Construction Industry Interest Inventory was utilized because it best reflected the body of knowledge pertinent to this study.

This review of literature assisted the researcher in establishing boundaries and limitations to the
prospective study. It also acquainted the researcher with previously related research and in developing procedures and methodological techniques for this study.
CHAPTER III

METHOD OF INVESTIGATION

Introduction

This chapter presents the research design, instrumentation, population and sample criteria, and procedures. Also included in this chapter are the sources of data, variables of the study, method of collecting data, and data treatment. Lastly, the objectives and hypotheses are stated in conjunction with the statistical procedures utilized.

This study compared the early achievement test scores of former WOC students with their current scores and with those of their peers who were exposed to TIA programs. The WOCCAЕI was administered in June of 1968 and April of 1972. The CIII was utilized in April of 1972 to determine the present level of the participating students' interest in construction industry technology. Cumulative records of the student sample were investigated to determine the extent of differences existing between choices of industrial arts courses and cumulative grade average for completed
industrial arts courses during the four-year period.

Population and Sample of WOC and TIA Students

All WOC students enrolled in the following Cincinnati, Ohio, junior high schools: Gamble, Walnut Hills, Dater, and Cutter in 1967-68 were assigned a number. After compiling a listing of the four-hundred sixty-seven students, the fifty-student WOC group was randomly selected by utilizing a table of random numbers (Sax, 1969, pp. 133-34) which indiscriminantly identified this representative sample.

A similar list of four-hundred fifty-two students who had participated in a traditional industrial arts program in the formerly-mentioned Cincinnati, Ohio, junior high schools in 1967-68 was compiled. The system used to identify the WOC sample was applied to select fifty students as the control group from the same schools.

It is assumed that the students were assigned to the experimental program (WOC) and the traditional one (TIA) on a random basis. Comparing students from both innovative and traditional programs from within the same junior
high schools therefore assisted in providing a comparative basis for judging WOC student performance. Two groups of students were selected according to the following criteria:

**Group A - WOC students**

Fifty randomly selected students who completed The World of Construction in 1967-68.

**Group B - TIA students**

Fifty randomly selected students who completed a traditional industrial arts course in 1967-68.

In the process of locating the fifty WOC students selected as the representative sample, it was discovered that seven students were no longer in the Cincinnati Public School System. Likewise the TIA group had six inaccessible students in the representative sample. Therefore, it was necessary to return to the table of random numbers and randomly select seven additional WOC students and six TIA students to complete the representative groups. Efforts to locate literature pertaining to this procedure produced no evidence to dispute it.
This descriptive study was conducted in Walnut Hills, Hughes, and Western Hills High schools in the Cincinnati Public School System in the Spring of 1972. These three high schools were recipients of the 1967-68 WOC and TIA students utilized in this research.

Western Hills High School had an enrollment of twenty-eight hundred students with approximately one percent black in contrast to Hughes High School with a reversal of approximately ninety-seven percent of the student population being black. Walnut Hills is a school of very high academic standing recruiting only the top ten percent of the students in the Hamilton County area.

**Design**

A modified form of the post-test-only control group design was utilized in this study (Campell and Stanley, 1969, p.25). It may be difficult for some to give up the need for equating both groups prior to the treatment, but the most adequate all-purpose assurance of preventing biases between groups is randomization.
Randomization can suffice without the aid of the pre-test. Hall and Dziuban (1968) indicated that:

...control by matching will always be limited to known variables. Where certain variables are known to affect outcomes, controls should be applied, if possible. However, random subject selection is the sine qua non. With it equalization of groups can be claimed for known and unknown factors. Furthermore, randomization is a basic assumption for most mathematical statistics to be valid (p. 91).

Research Model

The following research model was utilized in this study:

\[
\begin{align*}
R_1 & \quad X_1 \quad \delta_1 \quad \ldots \ldots \ldots \ldots \quad 0_2 \quad 0_3 \quad 0_4 \quad 0_5 \\
R_2 & \quad X_2 \quad \ldots \ldots \ldots \ldots \quad 0_2 \quad 0_3 \quad 0_4 \quad 0_5
\end{align*}
\]

Legend

- \(R_1\) - Randomly selected WOC students
- \(R_2\) - Randomly selected TIA students
- \(X_1\) - WOC Course (taken in 1968)
- \(X_2\) - TIA Course (taken in 1968)
- \(\delta_1\) - WOC CAEI administered in 1968
- \(\delta_2\) - WOC CAEI administered in 1972
- \(\delta_3\) - GIII administered in 1972
- \(\delta_4\) - additional industrial arts courses from 1968-1972
- \(\delta_5\) - grade point average of students in additional industrial arts courses from 1968-1972
Results of these measurements and observations provided the raw data which were analyzed.

Significant activity alternatives which the participants experienced and the time line constraint of this follow-up study are graphically illustrated in Figure 1:

![Diagram showing study design and sequence of procedures]

**FIGURE 1**

**STUDY DESIGN AND SEQUENCE OF PROCEDURES**
Study Design Legend of Figure 1

1. 1967 Fall enrollment of seventh grade male students in Walnut Hills, Dater, Gamble and Cutter Junior High Schools.

2. WOC students as seventh graders.
   2a. WOC students as eighth graders
   2b. WOC students as ninth graders
   2c. WOC students as tenth graders
   2d. WOC students as eleventh graders

3. TIA students as seventh graders.
   3a. TIA students as eighth graders
   3b. TIA students as ninth graders
   3c. TIA students as tenth graders
   3d. TIA students as eleventh graders

4. Identification of randomly selected sample for WOC and TIA groups.

5. Explanation and orientation of study to both groups.

6. Administration of WOGCAEI and CIII to all participating students and investigation of their educational cumulative records to reveal the number of industrial arts courses taken from 1968 to 1972 along with grade point average of these courses.
Instrumentation

The World of Construction Comprehensive Achievement Examination I

The WOCCAEl, developed by the IACF staff at The Ohio State University, sufficed as the evaluation instrument of the WOC. This achievement examination consisted of fifty multiple choice items and required forty minutes for administration. All students participating in the 1967-68 WOC were required to complete this exam at the conclusion of the course.

Table 2 provides information regarding the mean score of all 1967-68 WOC students throughout the nation on the WOCCAEl. The Cincinnati, Ohio 1967-68 WOC student scores were similar to the national WOCCAEl scores with a mean score of 27.01 and a standard deviation of 8.45.
### TABLE 2

SUMMARY STATISTICS FOR WORLD OF CONSTRUCTION COMPREHENSIVE EXAMINATION I (IACP, 1968)

<table>
<thead>
<tr>
<th>Summary Statistics</th>
<th>Scores</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of items on test</td>
<td>50</td>
</tr>
<tr>
<td>Number of students</td>
<td>1206*</td>
</tr>
<tr>
<td>Mean Score</td>
<td>28.86</td>
</tr>
<tr>
<td>Standard Deviation</td>
<td>8.90</td>
</tr>
<tr>
<td>Median Score</td>
<td>29.00</td>
</tr>
<tr>
<td>Mode</td>
<td>27.00</td>
</tr>
</tbody>
</table>

**Reliability Estimates**

<table>
<thead>
<tr>
<th>Kuder-Richardson 20</th>
<th>.730</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kuder-Richardson 21</td>
<td>.710</td>
</tr>
</tbody>
</table>

* The 1206 students represents all WOC students in the Cincinnati, Ohio, Dade County, Florida and Trenton, New Jersey IACP field centers.*
Another important facet of this study was to determine student interest in the construction industry. The Construction Industry Interest Inventory, developed by Darius Young at The Ohio State University (1960, p. 206) was found to be appropriate for this purpose. The interest inventory contains 131 items which are short descriptive phrases designed to describe the various construction industry practices. This inventory was selected because it best reflected the field of knowledge of construction industry technology. The areas representative of the construction industry technology are: 1) construction management practice, 2) construction production practice, and 3) construction personnel practice. Responses by the students to these items can provide information as to their career interests in all three categories of the construction industry technology. Subsequently, the individuals' score on this inventory reflects his interest rate in the construction industry. The CIII has a Kuder-Richardson reliability of 0.910 and an Odd-Even split half reliability of 0.910.
Research Variables

The independent variables of this study were the treatments the World of Construction course and the traditional industrial arts program offered in the previously mentioned junior high schools in Cincinnati, Ohio, in 1967-68. The TIA group also sufficed as a control group for variables such as maturation, history, mortality, testing treatment interaction, etc.

Dependent variables of this study were the students' scores on the achievement test and interest inventory instrument. Other dependent variables were the number of courses and grade point average of industrial arts courses taken during the four year period from 1968-1972.

In this follow-up study, several variables were considered that could have affected the desired results. Other important variables identified by this researcher were: 1) socio-economic environment, 2) age, and 3) sex. All students were randomly selected from similar backgrounds and environments to aid in the establishment of equivalence in both groups.
Investigation of all academic records of participating students was performed personally by this researcher. Also, all students were allotted twenty-five minutes for the WOC Comprehensive Achievement Examination I, and forty-five minutes for the Construction Industry Interest Inventory instrument.

Hypotheses

In this descriptive study, there are four objectives and five hypotheses.

Objective 1: To compare performance of 1967-68 WOC students on the World of Construction Comprehensive Achievement Examination I four years after completion of the course.

Hypotheses

$H_01$: There will be no difference in WOC student scores on the World of Construction Comprehensive Achievement Examination I administered in 1968 and 1972.

$H_02$: There will be no difference in 1972 between scores of WOC and TIA students on the World of Construction Comprehensive Achievement Examination I.

Objective 2: To compare 1967-68 WOC and TIA student performance on the Construction Industry Interest Inventory instrument four years from completion of the course.
Hypothesis

$H_0^3$: There will be no difference in the scores of 1967-68 WOC and TIA students on the Construction Industry Interest Inventory instrument in 1972.

Objective 3: To compare 1967-68 WOC and TIA students' selection of additional industrial arts courses from 1968 to 1972.

Hypothesis

$H_0^4$: There will be no difference in the selection of additional industrial arts courses of the 1967-68 WOC and TIA students from 1968 to 1972.

Objective 4: To compare 1967-68 WOC and TIA students' academic performance (grade point average) in additional industrial arts courses from 1968 to 1972.

Hypothesis

$H_0^5$: There will be no significant difference in academic success between 1967-68 WOC and TIA students in grade point averages for industrial arts courses taken from 1968 to 1972.

Statistical Treatment

All students responded to items on both instruments using specially coded answer sheets that were optically scanned and scored. All information on the answer sheets was then transferred to computer data cards.

The test results were tabulated and subjected to a correlated t-test and one way analysis of variance (ANOVA) statistical techniques. Also, the means were compiled of
the number of industrial arts courses and grade point averages of both groups to determine the level of significance.

Hypothesis one was statistically tested with a t-test for related samples utilizing a test-retest design (Peatman, 1963, p. 300). Hypotheses two, three, four, and five were subjected to a one-way analysis of variance statistical technique. The program utilized in this study computes the ANOVA table for fixed model single-factor experiments having either equal or unequal cell frequency (Weiner, 1962, pp. 97-100).

The .05 level of significance was adopted for this study to statistically test the five hypotheses. Acceptance or rejection of these hypotheses was determined by the .05 or less level of significance.

Summary

The design of this study was presented in Chapter III. The populations, samples, treatments, instrumentation, hypotheses, and statistical procedures involved in the analysis of the data were discussed in this chapter.
The participants were randomly selected from 1967-68 seventh grade populations in industrial arts from four Cincinnati, Ohio, junior high schools: Walnut Hills, Gamble, Dater, and Cutter. These students matriculated to three senior high schools where this researcher was able to locate and administer the evaluation instruments. These Cincinnati, Ohio, secondary high schools were: Walnut Hills, Western Hills, and Hughes.

One of the two instruments utilized in the study was the WOC Comprehensive Achievement Examination I (WOCCAII) developed by the IACP staff. The other was the Construction Industry Interest Inventory, developed by Darius Young at The Ohio State University in 1969.

The primary purpose of the study was to determine achievement and interest levels of WOC students on construction technology concepts four years after the completion of treatment. The WOCCAII was readministered in 1972 and the scores were compared to the previous 1968 scores to determine gain or loss in achievement. Also a comparison was made between the scores of WOC and TIA groups on this same instrument.

The CIII was utilized to determine if differences in interest of the construction industry existed between groups.
Lastly, the number of courses and the grade point averages of all industrial arts courses taken during the four year period were investigated to determine if differences existed. This researcher personally performed the investigation of cumulative records of all participating students.

An explanation was given as to how the data were collected, compiled, and tabulated. Five research hypotheses were stated in the null form relative to retention, achievement, interest in the construction industry, pursuit of additional industrial arts courses and grade point averages of additional industrial arts courses.

A t-test for determining differences between means of related samples was utilized to test $H_01$. Hypotheses two, three, four, and five were subjected to a one-way analysis of variance statistical technique. The statistical procedures mentioned were utilized to determine acceptance or rejection of the null hypotheses.
CHAPTER IV

ANALYSIS OF DATA

Introduction

The analysis of the data is presented in this chapter. Each of the previously stated hypotheses in Chapter III were tested, and the statistical analyses were indicated. Firstly, the analysis of the data is discussed by analyzing the 1967-68 WOC student scores on the World of Construction Comprehensive Achievement Examination I from 1968 to 1972, for achievement and retention, utilizing a t-test for related samples. Secondly, a one-way analysis of variance statistical technique was performed between both the 1967-68 WOC and TIA groups on the following four variables: (a) scores on the World of Construction Comprehensive Achievement Examination I, (b) scores on the Construction Industry Interest Inventory instrument, (c) selection of industrial arts courses from 1968-1972, and (d) grade point averages of students in industrial arts courses from 1968 to 1972.
The WOCCAEI (described in Chapter III and shown in Appendix C) was administered to a group of WOC students at the completion of "The World of Construction" industrial arts course in 1968. It was readministered to a sample of the original group in 1972, four years after completion of the course.

The following hypothesis was stated concerning the achievement and retention of construction technology concepts from 1968-1972 by the WOC students:

\[ H_{01} : \text{There will be no difference in 1967-68 WOC student scores on the World of Construction Comprehensive Achievement Examination I in 1968 and 1972.} \]

Hypothesis \( H_{01} \) was tested by the use of a t-test for determining differences between means of related samples, as suggested by John Peatman (1963, p. 300).

Table 3 shows the results of the t-test on \( H_{01} \).
TABLE 3

COMPARISON OF WOCCEAI SCORES
FOR ACHIEVEMENT AND RETENTION

<table>
<thead>
<tr>
<th>WOC Group</th>
<th>Mean Score</th>
<th>Standard Deviation</th>
<th>N</th>
<th>t Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1968 WOCCEAI</td>
<td>26.45</td>
<td>7.85</td>
<td>50</td>
<td>5.631</td>
</tr>
<tr>
<td>1972 WOCCEAI</td>
<td>33.52</td>
<td>11.61</td>
<td>50</td>
<td></td>
</tr>
</tbody>
</table>

The null hypotheses $H_0$ was rejected since the observed $t$-statistic of 5.631 exceeded the table value of 3.46 with 49 degrees of freedom at the .05 level, $t(.05, 49) = 3.46$.

In the compilation of the WOCCEAI 1968 and 1972 raw scores, it was found that thirty-five students significantly improved upon their 1968 scores. The test scores also indicated that seven students performed similarly to their 1968 raw scores. Lastly, ten students scored lower on the 1972 administration than on the initial examination in 1968. Subsequently, the performances of the participating WOC students on the WOCCEAI from 1968 to 1972 were by-no means uniform. (See Appendix A)
Analysis Of The WOC CAEI, CIII, Number Of Industrial Arts Courses And Grade Point Average Of 1967-68 WOC and TIA Students

A one-way analysis of variance statistical technique was applied to scores of both the WOC and TIA students on the following four variables: (1) achievement, as measured by the WOC CAEI, (2) interest as measured by the CIII, (3) number of industrial arts courses taken from 1968 to 1972, and (4) grade point average of industrial arts courses from 1968 to 1972.

The second hypothesis was concerned with the WOC CAEI test scores of both the WOC and TIA groups in 1972. Table 4 displays the results of the ANOVA procedure.
### Table 4

**Analysis of Variance, One-Way Classification, for the Variable—WOC and TIA 1972 WOCRAEI Scores**

<table>
<thead>
<tr>
<th>Source of Variation</th>
<th>Sum of Squares</th>
<th>d.f.</th>
<th>Mean Score</th>
<th>F-ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conditions</td>
<td>231.989</td>
<td>1</td>
<td>231.989</td>
<td>1.917</td>
</tr>
<tr>
<td>Experimental Error</td>
<td>11439.969</td>
<td>95</td>
<td>120.989</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>11725.958</td>
<td>96</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The null hypothesis two \( H_0 \) was not rejected since the observed F-ratio of 1.917 does not exceed the F-table value of 3.94 with 96 degrees of freedom at the 0.05 level, \( F(0.05, 96) = 3.94 \).
The third hypothesis stated concerned the scores of both the WOC and TIA groups on the CIII instrument in 1972 as indicated by Table 5.

**TABLE 5**

ANALYSIS OF VARIANCE, ONE-WAY CLASSIFICATION, FOR THE VARIABLE—1967-68 WOC AND TIA STUDENT CIII SCORES

<table>
<thead>
<tr>
<th>Source of Variation</th>
<th>Sum of Squares</th>
<th>d.f.</th>
<th>Mean Scores</th>
<th>F-ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conditions</td>
<td>48315.214</td>
<td>1</td>
<td>48315.214</td>
<td>5.376*</td>
</tr>
<tr>
<td>Experimental Error</td>
<td>853726.415</td>
<td>95</td>
<td>8986.594</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>902041.629</td>
<td>96</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Indicates a significant difference in group means at the .05 level of significance.

The null hypothesis \( H_0^3 \) was rejected since the observed F-ratio of 5.376 exceeded the table value of 3.94 with 96 degrees of freedom at the .05 level, \( F(.05, 49)=3.94 \). It was found that the WOC students' mean score was higher than the TIA students' mean score on the CIII instrument.
Hypothesis four ($H_0^4$) was stated in regards to the number of industrial arts courses taken by 1967-68 WOC and TIA students during the four-year period from 1968 to 1972. Table 6 indicates the results of the ANOVA statistical process on hypothesis four.

**Table 6**

**ANALYSIS OF VARIANCE, ONE-WAY CLASSIFICATION, FOR THE VARIABLE-- 1967-68 WOC AND TIA STUDENTS SELECTION OF INDUSTRIAL ARTS COURSES FROM 1968 - 1972**

<table>
<thead>
<tr>
<th>Source of Variation</th>
<th>Sum of Squares</th>
<th>d.f.</th>
<th>Mean Scores</th>
<th>F-ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conditions</td>
<td>4.068</td>
<td>1</td>
<td>4.068</td>
<td>2.015</td>
</tr>
<tr>
<td>Experimental Error</td>
<td>135.266</td>
<td>67</td>
<td>2.019</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>139.334</td>
<td>68</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The null hypothesis four ($H_0^4$) was not rejected since the observed $F$-ratio of 2.015 does not exceed the $F$-table value of 3.94 at the .05 level, $F(.05, 68)=3.94$. 
The last hypothesis (H₀₅) was primarily concerned with the grade point average of 1967-68 WOC and T.A students in industrial arts courses from 1968 to 1972. The analysis of variance statistical process utilized on hypothesis five (H₀₅) is exemplified in Table 7.

**TABLE 7**

ANALYSIS OF VARIANCE, ONE-WAY CLASSIFICATION, FOR THE VARIABLE—GRADE POINT OF INDUSTRIAL ARTS COURSES FROM 1968 TO 1972

<table>
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<th>Source of Variation</th>
<th>Sum of Squares</th>
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<th>Mean Scores</th>
<th>F-ratio</th>
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*Indicates a significant difference in group means at the .05 level of significance.
Null hypothesis five (H₀5) was rejected since the observed F-ratio of 10.103 exceeded the table value of 3.98 with 68 degrees of freedom at the .05 level, F(.05, 68)=3.98. The WOC students received higher grades in the industrial arts courses selected from 1968 to 1972 than the TIA students.

Summary

In this chapter, the data from the study were reported and analyzed, and the hypotheses were tested.

Through a t-test for determination of differences between means it was found that the WOC students scored at a higher level of achievement on the 1972 administration of the WOCCA EI than on the 1968 administration. The difference between the mean scores of this instrument was 7.07 which was significant at the .05 level.

A one-way analysis of variance statistical technique was utilized to test the following four variables between the 1967-68 WOC and TIA groups: a) scores on the WOCCA EI in 1972, b) scores on the CIII instrument, c) selection of industrial arts courses from 1968 to 1972, and d) grade point average of industrial arts courses selected from 1968 to 1972. It was found that significant differences were prevalent on the two variables,
a) interest in the construction industry and b) grade point average of industrial arts courses from 1968 to 1972, at the .05 level. No significant differences existed at the .05 level between the two groups on the achievement variable and industrial arts courses selected from 1968 to 1972.
CHAPTER V

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

In this chapter a summary of the research and a review of the findings will be presented. Conclusions will be drawn from the study. From these conclusions, recommendations will be made.

Summary

Within the last decade, many innovative approaches to the study of industrial arts have been developed. One of these has been translated into practice through the Industrial Arts Curriculum Project (IACP). The IACP-produced instructional system introduces junior high school students to modern industrial technology and provides a relevant orientation to our industrialized society.

Most of the research pertinent to curriculum evaluation of these new curriculum approaches has compared student achievement after the completion of a course. A necessary component of curriculum evaluation also should be feedback from studies of their long-range effects upon learners.
The purpose of this follow-up study was to determine longitudinal effects of the World of Construction (WOC) segment of the IACP program upon students after a period of four years.

A review of the related literature assisted the researcher in establishing boundaries and limitations for the prospective study. It also acquainted the researcher with previously related research and helped in developing procedures and methodological techniques for the study. It was found that innovative and more relevant curricula appeared to be advantageous to the retention and achievement of students' learning, when compared with traditional curricula. Also indicated was the fact that interest is not a separate psychological entity, but merely one of several aspects of behavior. It was found that the "Construction Industry Interest Inventory" instrument best reflected the body of knowledge pertinent to this study.

The design employed in this study involved a modified form of the post-test-only control group design. Subjects were randomly selected from 1967-68 seventh-grade populations in industrial arts from four junior high schools in Cincinnati, Ohio. These students
matriculated to three senior high schools where the researcher was able to locate them and to administer the instruments. One of the instruments utilized in this study was the WOC Comprehensive Achievement Examination I (WOCCAEI). The other was the Construction Industry Interest Inventory (CIII). The WOCCAEI was readministered in 1972, and the test scores were compared to the previous 1968 scores to determine retention and achievement of WOC students throughout the four-year period. A comparison also was made between the scores of WOC and TIA groups on the same instrument.

The CIII was utilized to determine if differences in interests of the construction industry existed between groups. The number of courses and the grade point average of all industrial arts courses taken during the four year period were investigated to determine if differences existed between the WOC and TIA students.

The findings of this study are revealed in the following statements:

1. As a result of a t-test for differences between samples of 1968 and 1972 WOC student scores on the WOCCAEI, a statistically significant difference was noted in favor of the students' performance in the 1972 administration.
2. As a result of a one-way analysis of variance statistical technique, an F-ratio indicated that the:

a. 1967-68 WOC students did not significantly differ from the 1967-68 TIA students on the 1972 administration of the WOCCAIE.

b. 1967-68 WOC students scored significantly higher on the CIII instrument than did the 1967-68 TIA group.

c. 1967-68 WOC and TIA students did not significantly differ in selection of industrial arts courses from 1968 to 1972.

d. 1967-68 WOC students received significantly higher grades in industrial arts courses from 1968 to 1972.

Conclusions

In a study of this nature, the conclusions may be made with the knowledge that the observations and generalizations cannot extend beyond the limits of the selected Cincinnati, Ohio, public schools. Based on the statistical analysis of the data, the following hypotheses and conclusions are presented:

\[ H_0: \text{There will be no difference in 1967-68 WOC student scores on the World of Construction Comprehensive Achievement Examination I in 1968 and 1972.} \]

From the evidence reported in this study, it can be stated that the 1967-68 WOC students scored signifi-
cantly higher on the 1972 administration of the WOCCAEI than they did in 1968. One contributing factor to the higher scores on the 1972 administration, as indicated by Flis (1969) et al, could have been that factual knowledge is forgotten whereas generalizational knowledge, interpretational ability, and applicational ability, as advocated by the WOC course, are increased with the passage of time. Another factor could be the overall growth of the students during the four year period from 1968 to 1972 due to maturation, subsequent learning and experience, and additional education.

Without regard to the second hypothesis, this finding tends to support the findings of Flis et al. However, when the first two hypotheses are considered collectively, something more apparently is required to account for the equal WOC-TIA student achievement scores in 1972.

Investigation of the raw score data provided evidence that increase in achievement was not uniform. Further analysis indicated that WOC students who selected no additional industrial arts courses during the four year period increased their WOCCAEI scores. Whereas the students who selected four or five industrial arts courses during the four year interim lowered their WOCCAEI scores.
This suggests that counselors and teachers encouraged the better students to pursue the college preparatory curricula and to avoid the practical arts courses.

\( H_0 \): There will be no difference in 1972 between scores of WOC and TIA students on the World of Construction Comprehensive Achievement Examination I.

From the evidence reported in this study, the 1967-68 WOC students did not score significantly higher on the WOCCEAI administered in 1972 than the 1967-68 TIA students. Although the WOC group mean score was higher on the 1972 WOCCEAI, with a 33.51 compared to 30.45 for the TIA group, it was not significant at the .05 level. The indicated difference could have been attributable to the WOC group having taken the test twice while the TIA group took it only once.

On the face of it, this finding could suggest that there is little reason for recommending the WOC course at the seventh grade level if, after four years, having had the course does not provide an advantage over having had a TIA course. However, taken collectively with the other findings, there are other apparent benefits which accrued to students who completed the WOC course. This
finding definitely suggests that the merits of the WOC course may lie in its ability to develop ancillary outcomes such as increased interests and general study skills, rather than subject matter achievement such as that which is measured by written achievement tests.

Another factor that possibly contributed to the lack of a significant difference between the WOC and TIA students could have been attributed to the John Henry effect (Saretsky, 1972, pp. 579-581). The TIA students and teachers might have extended additional effort to perform as well as the WOC group on construction technology concepts. Also, the limitations of the initial comprehensive examination were prevalent.

H₃: There will be no difference in the scores of 1967-68 WOC and TIA students on the Construction Industry Interest Inventory instrument in 1972.

From the evidence reported in this study, the WOC students scored higher on the CIII than did the TIA students. A major contributing factor to the WOC students' higher scores on the CIII as indicated by Strong (1943) is that interests must be learned. Since the WOC students were subjected to the many facets of construction technology in the one-year course, their interest level in the construction industry was enhanced.
\( H_0^4: \) There will be no difference in the selection of additional industrial arts courses of the 1967-68 WOC and TIA students from 1968 to 1972.

From the evidence reported in this study, it was found that no difference existed between the two groups in selection of additional industrial arts courses from 1968 to 1972. This suggests that the WOC and TIA industrial arts courses prompted similar motivation and stimulation to pursue additional industrial arts courses.

\( H_0^5: \) There will be no significant difference in academic success of 1967-68 WOC and TIA students in regards to their grade point averages in industrial arts courses taken from 1968 to 1972.

From the evidence reported in this study, it was found that the WOC students received higher grades in the additional industrial arts courses from 1968 to 1972. Flis (1969) indicated that generalizational ability, applicational ability and interpretational ability, as advocated by the WOC course, increase as the student progresses which could be contributing factors to the WOC students' higher grades.

Without regard to the second hypothesis, it is apparent that this hypothesis supports the Flis et al theory. However, when the second and fifth hypotheses are considered together, the findings do not lend support to the position advocated by Flis et al.
Recommendations

From the evidence in this study, the following recommendations are made:

1. instruction might well emphasize general knowledge, interpretational ability, and application ability in order to promote continued educational development beyond specific course completion.

2. expand the concept of evaluation to include the need for more and broader-based longitudinal data in order to provide a broader context within which to interpret individual course contributions.

3. desired outcomes in student interests should be developed within the instructional program.

4. lower level innovative programs should not be resisted simply because of a fear that they will negatively affect subsequent course selections or achievement.

Also, the following recommendations for further research are made:

5. to extend the time continuum of this research,

6. to replicate this study in other school systems throughout the United States,

7. to replicate this study with the IACP World of Manufacturing students,

8. to develop a similar follow-up study with students who completed a two year sequence of the IACP industrial arts program in contrast with those students who completed a two year sequence of a traditional industrial arts program,

9. to replicate and expand this study to statistically analyze the further relationships of WOC
experience to performance in other school and non-
school activities, such as reading achievement
and recreational choices, for example, and

10. to study the relative performance abilities of
IACP and TIA students along a time continuum,

11. to further investigate the cause of equal IACP-
TIA WOC achievement test scores, after an extend-
ed period of time, since other research has found
a significant difference in achievement levels,
between these groups, at the time of course
completion (Dugger, 1970).
## APPENDIX A

### 1967-68 World of Construction Student Data

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Directions

1. The items on this test are multiple choice items designed to see how much you know about construction technology.

2. You will record your answers to the questions on a separate answer sheet. The answer sheet will be sent to Columbus, Ohio for scoring. Be sure you have filled in the information on the answer sheet as follows:
   a) At the top of your answer sheet PRINT your name, (last name first) today's date, the name of your school, and the city and state in which your school is located.
   b) In the blank entitled "Name of Test" PRINT the name of the test and "Form."

3. Read the directions on the answer sheet carefully. In marking your answer sheet, use ONLY a No. 2 pencil. Be careful to notice that the blanks for answering questions are arranged ACROSS the page: Items 1 through 8 are on the first line from left to right; Items 9 through 16 are on the next line, etc. When you have chosen the answer you think is correct, BLACKEN the appropriate blank neatly and fully. If you change your mind about an answer, erase your first mark completely and make a new one.

4. Make no stray marks on the answer sheets, and do not wrinkle, fold, or tear the answer sheet.

5. Be sure you answer all questions on the test. Your score will be determined by the number of items you have answered correctly.

6. When you finish the test, sit quietly and wait until your teacher collects the answer sheet and test booklet.

Prepared for experimental use in selected junior high school courses in industrial arts during the 1969-1970 school year.

A publication of the Industrial Arts Curriculum Project conducted by The Ohio State University in cooperation with the University of Illinois, and supported by a grant from the United States Office of Education.
1. The part of the economic system that makes changes in the form of materials is called
   A. the economy
   B. industry
   C. industrial arts
   D. the government

2. Technological advances result in
   A. increasing the production of goods and profits
   B. increasing the cost of goods
   C. decreasing the standard of living
   D. increasing the number of employed workers

3. The two major elements of industry are
   A. material goods and non-material goods
   B. the economy and the government
   C. transportation and domestic services
   D. construction and manufacturing

4. Planning, organizing, and controlling men, materials, and processes to produce and maintain structures is called
   A. design technology
   B. servicing industry
   C. the economic system
   D. construction technology

5. If a good employee is rewarded by increased duties and wages, he has most likely been
   A. fired
   B. hired
   C. advanced
   D. retired

6. Construction technology is one part of
   A. personnel technology
   B. management technology
   C. industrial technology
   D. production technology

7. The photograph in Figure 1 shows a mason laying blocks. What construction production activity does this illustrate?
   A. Processing
   B. Pre-processing
   C. Post-processing
   D. Finishing

8. Practices that concern hiring, training, working, advancing, and retiring people are known as
   A. collective bargaining
   B. production technology
   C. personnel technology
   D. management technology
9. The management task of supplying men and materials for a job falls in the category of
   A. engineering
   B. planning
   C. controlling
   D. organizing

10. Supervising workers is part of the management practice of
   A. administration
   B. planning
   C. organizing
   D. controlling

11. Skilled craftsmen such as plumbers, electricians, bricklayers, and carpenters form a group known as
   A. production workers
   B. managers
   C. apprentices
   D. office personnel

12. A building-trades journeyman learns his special skills in
   A. high school
   B. college
   C. an apprenticeship program
   D. an induction program

13. In the construction industry, architects
   A. provide loans for the purchase of houses
   B. complete the finish carpentry in houses
   C. act as legal counsel when houses are purchased
   D. plan and design houses

14. The part of construction technology that deals with pre-processing, processing, and post-processing of materials is called
   A. management technology
   B. production technology
   C. personnel technology
   D. industrial technology

15. The engineer and his staff who design and engineer a bridge are performing a function of management known as
   A. post-processing
   B. planning
   C. organizing
   D. controlling

16. A written agreement to buy a lot from its owner for a certain amount of money is called
   A. a purchase offer
   B. a deed
   C. a title
   D. a mortgage

17. Before purchasing real estate, the buyer should
   A. compare the legal description of the site with the site
   B. set a deadline for completing construction
   C. approve the final design for the project
   D. select a contractor to build the project

18. A construction contractor is responsible for
   A. designing the building
   B. paying the laborers and suppliers
   C. selecting the site
   D. mapping and surveying the site

19. A topographic map of a proposed building site shows
   A. who owned the land before it was sold
   B. the types of soil on the site
   C. the location of the proposed structure on the site
   D. the natural features and shape of the land
20. A proposed highway will have an elevation of 860'. Which point on the profile chart shown in Figure 2 already has this elevation?

A. Point #1  
B. Point #2  
C. Point #3  
D. Point #4

21. The two major parts of any structure are the

A. steel and concrete parts of the structure  
B. single and double parts of the structure  
C. classified and unclassified parts of the structure  
D. substructure and superstructure

22. One task which is usually not involved in clearing a site is

A. placing batter boards  
B. burning brush  
C. stockpiling topsoil  
D. removing trees or rocks

23. A crane and wrecking ball are used to remove an old building from a city lot. This kind of site-clearing operation is called

A. salvaging  
B. demolishing  
C. cutting  
D. burning

24. Three elements of a concrete frame are;

A. plumbing, wiring, carpentry  
B. subfloors, top plates, anchor bolts  
C. columns, beams, slabs  
D. derrick, boom, mast

25. A feasibility study should answer the question,

A. Is there a need for the project?  
B. Who will build the project?  
C. Is the deed to the property clear?  
D. Who will design the project?

26. If you find that a building will cost more to construct than you had planned to spend, you most likely would

A. forget about constructing the new building  
B. build the building anyway  
C. study ways of reducing the construction costs  
D. ask a construction contractor to bid on the new building

27. The dimension 16'-0" shown in Figure 3 means that the

A. wall will be sixteen bricks long  
B. length of the wall will be sixteen feet  
C. brick wall will be sixteen inches long not including the window  
D. length of sixteen bricks is sixteen feet
31. The major types of dams are
A. metal and wood
B. electrical and gas powered
C. curved and sloped
D. earth-filled and concrete

32. What materials are commonly used to fasten together the steel framework of a skyscraper?
A. Steel bands, wire, and steel pins
B. High-strength bolts, welds, and rivets
C. Screws, nails, and special metal glue
D. Reinforced concrete, wood beams, and metal ties

33. Designing a new home so that there is a special playroom next to the children's bedroom would satisfy
A. an income requirement
B. a personal requirement
C. a geographic requirement
D. an architectural requirement

34. Plumbing systems of copper tubing are usually fastened together by
A. turning threaded fittings
B. forcing molten lead into the joint
C. gluing the pipe ends together
D. sweat-soldering

35. Systems of pipes or wires which provide essential services to structures and the people who use them are called
A. air ducts
B. plumbing
C. communications
D. utilities
36. Risers, stringers, and treads are parts of
A. stairs  
B. door frames  
C. walls  
D. floors

37. In Figure 5, the roof with the steepest pitch is
A. Roof A  
B. Roof B  
C. Roof C  
D. Roof D

38. Putting in a lawn by placing pieces of rooted grass together is called
A. tilling  
B. sodding  
C. seeding  
D. pruning

39. The type of exterior wall to be used on a new bank is selected by the
A. contractor  
B. carpenter  
C. foreman  
D. architect

40. Why are inspections important in construction?
A. To speed up work  
B. To finish construction work and discuss final pay  
C. To assure proper workmanship and proper use of materials  
D. To raise the pay of workers

41. Four general kinds of servicing practices are
A. repairing, maintaining, altering, and installing  
B. planning, organizing, controlling, and installing  
C. operating, organizing, reporting, and maintaining  
D. maintaining, finishing, storing, and receiving

42. New developments in construction in the near future will probably include the use of
A. computers to do all the construction work  
B. prefabricated and modular units  
C. many more unskilled workers  
D. less steel and concrete

43. Water which is to be used by a city is usually treated or purified
A. after the water has been piped from the tower to the individual homes  
B. before it is removed from a lake or stream  
C. before it is pumped to a water tower for storage  
D. at the sewage disposal plant
44. The flood plains along rivers are often the location of industries because they
   A. provide a water supply and a means of waste disposal
   B. are the only locations large enough for the industries
   C. are close to existing railroad services
   D. are close to housing developments

45. The construction of most of the streets in your community was paid for by the
   A. Department of Public Works
   B. members of your city council
   C. federal government
   D. people in your community through taxes

46. If there is a dispute between labor and management, which party is most likely to start a strike?
   A. Union leaders
   B. Management
   C. Construction foremen
   D. Government representatives

47. If you were asked to be an arbitrator to settle a dispute between labor and management, you should try to make an award which would be
   A. equally favorable to both labor and management
   B. equally favorable to the workers and the government
   C. favorable to the workers
   D. favorable to management

48. The federal government will generally act in settling strikes when the strike
   A. favors the union
   B. is unfair to a worker
   C. causes a "picket line"
   D. causes great inconvenience to the public

49. The best place for high-density housing would be
   A. in a large city near shopping centers, schools, and main streets
   B. near a large city, but away from public utilities and stores
   C. in a small town where property is inexpensive
   D. in a rural area

50. The main reason your school building was constructed was because
   A. it satisfied a social need of the people in your community
   B. there must be a certain number of schools in each city
   C. the city had to build something with their extra money
   D. that area seemed like a good place to build a school
This Construction Industry Interest Inventory is an inventory of your interests in the construction industry. It is not a test and will not have any effect on your classroom grade. There are no answers which are right or wrong. The response you select is only true for you. Please carefully follow the directions stated below.

DIRECTIONS

On each page of the booklet you will find statements describing the various practices occurring in the construction industry. Read each statement carefully before making your response.

You have been given a separate sheet for indicating your degree of interest. Look at the response sheet. The responses are numbered across the page, not down as in the booklet, and the spaces have letters from 1 to 5. They should be marked as follows:

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<tr>
<td>Most Interest</td>
<td>Above Average Interest</td>
<td>Average Interest</td>
<td>Below Average Interest</td>
<td>Least Interest</td>
</tr>
</tbody>
</table>

Use the soft lead pencil provided for you and make a heavy black mark in the space between the dotted lines. Mark only one space for each response. The following examples are marked in the proper manner.

Most Interest

Average Interest

Least Interest

Overseeing construction work crews

Removing concrete forms

Making out checks for workers' wages

As you mark the response sheet, it is important that you remember which letters indicate the amount of your interest. For instance, the number 1 represents the most interesting, and the number 5, the least interesting. Please indicate your degree of interest to the statement.

If you want to change your mind, carefully erase the first response, and mark your new choice.

USE THE SPECIAL PENCIL to mark your responses on the IBM scoring sheet.

Please open the booklet, and go ahead with the activities on the next page.
CONSTRUCTION INDUSTRY INTEREST INVENTORY

1. bolting structural steel sections together
2. building porches
3. shoveling sand, gravel and cement
4. transporting concrete with a wheelbarrow
5. removing wall partitions from buildings
6. painting structure surfaces
7. building stairs
8. drilling holes in rock for blasting
9. preparing the soil for planting
10. Excavating earth for a swimming pool
11. constructing fireplaces in buildings
12. sandblasting stone buildings
13. cutting glass and installing windows
14. repairing broken water and gas pipes
15. transporting concrete with transit-mix truck
16. welding steel gas pipes
17. buying construction materials and equipment
18. installing water pipes in structures
19. constructing temporary gravel roads
20. digging ditches with a power trencher
21. spraying concrete with curing compounds
22. consulting with other companies about construction problems
23. moving piles of earth with a bulldozer
24. inspecting completed construction jobs
25. building fences around structures
26. bending electrical conduit
27. making working drawings of structures
28. digging canals with power shovels
29. hoisting steel "I" beams with a crane
30. laying subflooring
31. giving workers aptitude tests
32. assembling steel television towers
33. placing steel beams in structures with a derrick
34. constructing outdoor barbecue pits
35. consulting with a lawyer about legal problems
36. hanging doors
37. taking care of employee records
38. sanding wooden floors
39. laying bricks and concrete blocks
40. leveling road beds with a grader
41. analyzing soil characteristics
42. designing future structures
43. installing drain gutters and downspouts
44. removing snow from highways with a snow plow
45. planting trees and shrubs around structures
46. applying siding to outside walls
47. overseeing construction progress
48. setting reinforcing steel in concrete forms
49. shaking or vibrating fresh concrete
50. overseeing construction work crews
51. sifting sand and gravel for concrete mixes
53. reading construction reports and blueprints
54. representing construction workers in a union
55. placing concrete in forms
56. constructing docks for boats
57. applying insulation materials in wall sections
58. interviewing future workers
59. teaching and instructing new construction workers
60. hanging wall paper
61. building room dividers
62. cutting and fitting wallboard materials
63. hoisting roof trusses into position
64. aligning walls with a level
65. patching plastered walls
66. bargaining with workers on strike
67. finishing concrete with a trowel
68. surveying future construction sites
69. installing electrical wiring in structures
70. cutting and fitting wall paneling
71. waterproofing foundation walls
72. replacing old electrical wiring
73. breaking up concrete with a jack hammer
74. building hydro-electric dams
75. sawing and fitting floor joists
76. choosing new sites for construction
77. burning trees and brush on construction sites
78. planting lawns
79. repainting houses with a spray gun
80. making models of structures
81. installing built-ins
82. bidding on future construction projects
83. blasting rocks and tree stumps
84. surfacing concrete highways
85. installing furnaces in structures
86. installing underground lawn sprinklers
87. firing or laying off workers
88. assigning new workers to their jobs
89. constructing small dams to divert rivers
90. building interior wall partitions
91. conducting tests on fresh concrete
92. removing concrete forms
93. salvaging usable building materials
94. bracing the walls of tunnels
95. cutting steel beams with oxyacetylene torches
96. installing air conditioners
97. paying workers
98. installing electrical switches and lights
99. making foundation forms
100. wrecking buildings with a crane and steel ball
101. erecting steel suspension bridges
102. constructing additional rooms
103. disciplining workers
104. hauling sand and gravel in a dump truck
105. applying caulking compound in wood joints
106. laying floor materials
107. arranging finances for construction projects
108. plastering walls
109. promoting construction workers to better jobs
110. rewarding construction workers
111. hiring construction workers
112. building carports
113. choosing workers for construction crews
114. trimming trees and hedges
115. applying ceiling materials
116. fitting wall baseboards and moldings
117. fitting and assembling heating and cooling ducts
118. making lily ponds in front of buildings
119. installing electrical high power lines
120. mixing concrete
121. making topographical maps for highways
122. nailing joists to sills
123. installing kitchen appliances
124. waxing and polishing stone floors
125. laying steel rails for railroads
126. fitting and soldering copper water pipes
127. cutting reinforcing steel
128. cutting grass around structures
129. paving asphalt streets and roads
130. giving safety equipment to workers
131. constructing patios
Dr. Darius Young  
University of Alberta  
Edmonton, Canada  

Dear Dr. Young:

In reviewing your dissertation entitled "The Development of a Construction Industry Interest Inventory", I discovered that your interest inventory instrument would be beneficial to my study. Since it was a 1968 copyright, I would like to request your permission to utilize this instrument in my study entitled "A Longitudinal Evaluation of the 1967-68 IACP Students". The CIII instrument will be administered to both the IACP and traditional industrial arts students to determine if differences of construction industry interest levels exist between the two groups. If permission is granted I will administer this instrument in March of 1972.

Thank you very much.

Sincerely,

Larry W. Browder  
School of Technology  
Indiana State University
March 15, 1972

Larry W. Browder  
RR 21, Box 214  
Terre Haute, Indiana 47802

Dear Sir:

The members of the Research committee have approved your revised request to conduct "A Longitudinal Evaluation of 1967-68 Industrial Arts Curriculum Project Students." Mr. Jack D. Ford has agreed to serve as a liason person for you in this project. Please contact Mr. Ford at the Education Center 230 E. Ninth Street, Cincinnati, Ohio 45202 for further assistance.

Sincerely,

E. Jane Mueller
March 17, 1972

Mr. Larry W. Browder
School of Technology
Indiana State University
Terre Haute, Indiana

Dear Mr. Browder:

Your letter of March 7, 1972, is at hand. You may use the CIII instrument which I developed. However, I would like to call your attention to the fact that the instrument was developed in 1968 and may need to be up-dated in light of I.A.C.P. modifications. I will leave that problem with you. The nature of your study sounds interesting and I would be interested in your results.

Sincerely yours,

Darius R. Young, Ph.D.
Associate Professor
March 22, 1972

Mr. Jack Ford
Education Center
230 E. Ninth Street
Cincinnati, Ohio 45202

Dear Jack,

I was very much relieved to receive approval of my study by the research division of the Cincinnati Public School System and want to thank you for serving as the liaison person. May I arrange an appointment with you on April 6, 1972, at 10:30 a.m. to discuss the ramifications of the study? If this time isn't conducive to your schedule please advise me and I will rearrange the tentative appointment.

Enclosed is a list of sixty-one randomly selected 1967-68 IACP junior high school students. Would you please assist me in locating these students throughout the Cincinnati school system?

Also, would you please select four junior high schools that offered traditional industrial arts in 1967-68 that were comparable to the four IACP schools? I would like to administer the two instruments in the latter part of April.

Thank you very much for your most appreciated assistance.

Sincerely,

Larry W. Browder
School of Technology
Indiana State University
March 24, 1972

Mr. Larry W. Browder
School of Technology
Indiana State University
Terre Haute, Indiana 47809

Dear Larry:

April 6th will be fine with me. We can talk and organize how we can do what you want at that time. I will investigate to see if I can find out how we can locate these students.

I will look forward to seeing you at 10:30 on the 6th. My office is on the 8th floor.

Enclosed please find a pass to park on our lot. As you are coming down I-75 South, take the 7th Street exit. Continue on 7th Street until you come to Broadway and then turn left. Take Broadway for two blocks and turn left again on 9th Street. Our lot is on the corner of 9th and Broadway.

Sincerely,

Jack D. Ford
Industrial Arts Supervisor
BIBLIOGRAPHY


