AN ANALYSIS OF THE IMPACT OF PROGRAM CHANGE ON SCHOOL PLANTS

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THESIS

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ABSTRACT

AN ANALYSIS OF THE IMPACT OF PROGRAM CHANGE
ON SCHOOL PLANTS

by Carl T. Bergstrom

Body of Abstract

The present investigation is an analysis of the impact of program change upon the educational adequacy of selected public elementary school plants in Detroit, Michigan. In addition, it seeks to identify the key factors which have produced differences in educational adequacy resulting from program change.

The Detroit Public Schools were selected for the study because of the major program alterations taking place as a result of a Citizens Advisory Committee's work during 1957. One of the most striking alterations has been the removal of grades 1 and 2, and 3 where possible, from the Detroit platoon plan in favor of the self-contained classroom. Within this framework, it was necessary to determine the educational program existent prior to 1957 and to apply this program on the elementary school plants consistent with the study. These same plants were also evaluated against the educational program operative in 1960. The difference between these two evaluations were then compared for the effect of the program change. In order to provide a broader base for any judgments resulting from the evaluations, three groups of five plants each were utilized for a total of fifteen school plants: old plants, middle-aged plants, and new plants. The differences were also compared among these groups.

The method of evaluation of the school buildings was individual visitation. During each visit the researcher went around and through each building, site, and attendance area. The basic instrument utilized for the evaluations was the "Citizens Workbook for Evaluating School Buildings," by Jack Landes and Merle Sumption. At least one day was spent in evaluating each school plant.

As a result of this study, the following conclusions seem warranted:

1. Where major program modifications occur, the educational adequacy of existing school plants decreased significantly.
2. Where major program modifications occur, the educational adequacy of old school plants tends to be reduced significantly more than new school plants.
3. Where major program modifications occur, the educational adequacy of middle-aged school plants tends to be reduced slightly more but not significantly more than new school plants.
4. Certain items may be singled out as contributing most to the reduction in educational adequacy as a result of program modification, namely, and in this order:
   a. Classroom shortage
   b. School layouts hamper easy movement from place to place.
   c. Academic classrooms tend to be too small.
   d. Gymnasiums, cafeterias and similar general service facilities tend to be too small in the event of expansion.

e. Toilet facilities seem inadequate.

f. Walls between adjacent rooms are too often load-bearing and not easily moved.

g. Some rooms are not as cheerful and attractive as they should be.

h. Playgrounds, outdoor areas, and recreational areas are not, in all school plants, readily accessible to pupils who use them.

i. General service provisions are not always readily accessible.

j. Some sites are not attractively planned and landscaped.

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By

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CHAPTER I

INTRODUCTION AND NATURE OF THE PROBLEM

School buildings have been receiving increased attention in recent years. One aspect of this attention has been directed toward fitting existing physical structures to a changing educational program. The present investigation is an attempt to evaluate the relationship between educational programs and existing school plants.

STATEMENT OF THE PROBLEM

The present investigation is an analysis of the impact of program change upon the educational adequacy of selected public elementary school plants in Detroit, Michigan. In addition, it seeks to identify the key factors which have produced differences in educational adequacy resulting from program change.

IMPORTANCE OF THE PROBLEM

This study attempts to fill the need of evaluating existing school plants in relation to school programs. Education needs to know more precisely the effect, if any, school programs have on school plants--both existing plants and those to be planned in the future. This study is restricted to existing school plants, yet this analysis should divulge information which will assist educators in stressing the importance of developing school programs prior to constructing new school plants, in supporting the need for precision in educational

specifications of new plants, and in providing a basis for decisions of modernization or abandonment of existing school buildings. This study should be directly helpful to the City of Detroit which must decide whether to maintain or abandon old school plants.

The problem of school housing has caused national concern. Prodded by a population explosion, increased attention is being given to general school needs. These general school needs are being pointed up by school-plant planners seeking more effective and efficient structures to house a changing educational program.

In 1950, "Speaking in his capacity as Federal Security's Administrator, Oscar R. Ewing stated: 'President Truman has advocated a nationwide survey---state by state---of school building needs. Probably one-fifth of this nation's school buildings are obsolete to the point of being unsafe, unsanitary, and unfit for human use. Many of these buildings are acknowledged as firetraps. With millions of our children already jampacked in over-crowded classrooms, cloakrooms, church basements, or even garages---or going to school part-time shifts . . . (a goal must be established) . . .to provide adequate schoolhousing for the nation's children.'" (4, p 50)

The most accurate report of the present magnitude of the housing problem is reported by the American School and University magazine, which declared that,". . .There were 7379 public school buildings constructed during 1959 at a cost of 2.6 billion dollars."(29, p 118) "Enrollments during the next ten years are expected to continue to rise . . .(and). . .It is not unrealistic to anticipate, for the 1960's, an average annual expenditure for educational construction of four billion dollars or more." (29, p 124)

Stoddard cautions us against a superficial view of the housing needs, stating that "...the problems involved are not only more buildings, more classrooms, more equipment. Equally important and possibly more basic are such considerations as what kind of facilities are needed to serve best the many changes that have come, or are impending in the school program itself." (77, p 24) And he adds:

> "The tragic danger in connection with this problem is that in our zeal to provide adequate school housing for vast numbers in a short space of time we will make the mistake of assuming that our school program is static and, therefore, our school building planning should be the same. Nothing could be more disastrous for America's schools than to repeat some of the school architecture of the past and present and to perpetuate for generations to come the inadequacies of so much of the existing school facilities. Unless schools built in this generation can and do reflect and provide the kind of school program that is evolving out of modern life and its needs, it would be better to continue to live with the shortage until our vision catches up with the times!" (77, p 25)

Most of the school-plant planners would hope to avoid the situation presented by Stoddard. Hagman, for one, has provided a frame of reference with sixteen general building considerations, of which a few are quoted below:

"1. The building plan should grow out of the educational plan and should be capable of being modified as the educational plan changes.

* * *

3. The building should be functional, that is, built to perform an educational task rather than just to shelter against sun, wind, rain, and cold.

4. The building should be an efficient instrument in education, unobstrusively but effectively contributing to the educational activity.

* * *

6. The building should be flexible so that it may adjust easily to changing demands upon it as an educational instrument.

7. The building should be attractive so that it may contribute to the good living of all who live with it.

* * *

9. The building should be part of its neighborhood, fitted to the site, and adding to the attractiveness of the area about it.

10. The campus should be planned with the building so that campus and building can be coordinated in serving effectively the educational needs of the school...." (40, p 306)

The Michigan Department of Public Instruction more specifically suggests, "Before buildings can be designed, it is essential to know what is to be done in them and how it is to be done. The "what" and "how" are, in essence, the educational program. The determination of the long-range program depends upon the answers to a number of specific questions:

1. What will be the community use of the school buildings and facilities?
2. How will the school site be used?
3. How will the school system be organized?
4. What are desirable school sizes?
5. What are desirable class sizes?
6. What will be included in the school curriculum?
7. What implications do the methods of teaching have for the school building program?
8. What special services will the school provide?
9. What non-classroom activities will the school sponsor?" (14, p 14-15)

The National Council on Schoolhouse Construction adds:

> "Educational plants cannot be planned intelligently until the scope of the program, curriculum content, and basic educational methods have been determined. The decisions can be made only with a sound philosophy of the aims and purposes of education as a base. Educational aims and objectives are not easy to define because education for an ever-changing society must be dynamic. Yet it is both an opportunity and an obligation for the local school system to undertake this task as the first step in a building program." (57, p 2)

The significance of planning for a particular program is highlighted by MacConnel, who states, "Perhaps the weakest link between planning and building is interpreting the needs of those using the completed facilities. This problem of interpreting demands a fresh approach to school planning---a formulation of a systematic procedure for designing facilities for schools. To accomplish a functional and economical school design, facts are needed concerning the school program during the initial planning stage." (51, p 145)

Yet there are proponents of the position that the teacher is the sole concern in providing good instruction, exclusive of physical plant. This position is stated and refuted succinctly by the Committee for the White House Conference of Education stating, "It is easy to say that the ideal school is Mark Hopkins at one end of a log and the pupil at the other, but most Americans want their children in well-heated, well-ventilated, fireproof quarters, with the best lighting obtainable for young eyes. They want separate classrooms for each grade, and they do not want the classes too large. They want auditoriums for school plays, lunchrooms where children can eat, and gymnasiums for basketball games. They want school buildings to be handsome both inside and out. They want at least 5 acres of lawn, parking space, and playgrounds to surround each elementary school, and 10 acres for each high school. In short, the American people are not inclined to stint themselves when it comes to building schools." (12, p 25)

After the construction of a plant, it receives attention to determine its continued adequacy as an educational instrument. As the need arises a plant may be remodeled, rehabilitated, repaired, or modernized. Modernization is directly tied to the educational program by Nelson E. Viles who states: "The modernization programs are designed primarily for the purpose of adapting existing facilities and spaces to meet the needs of changing educational programs." (82, p 2) Hynds also notes the purpose of modernizing buildings by stating, "In every community there are school buildings which no longer meet the housing requirements of the educational program of today..." yet, "...we are providing the environment for learning, an environment which determines to a considerable extent the effectiveness of the education of the children who attend that school." (46, p 41) Hynds continues, "The first question to be answered is, 'What are the educational needs of this district today and for the foreseeable future, and can this building be made to serve them?'" (46, p 42)

In addition to the welfare of the pupils, the welfare of the staff is considered by Miller, who declares, "Indirectly affecting the growth of children, but just as important, are the needs of school staff members. Conference rooms for meetings with parents and other staff members; storage spaces for instructional materials; filing facilities for records and reference materials; spaces for preparation of materials; rooms for relaxing during the school day--- all contribute to staff efficiency and subsequently to a better instructional program." (55, p 368)

Hynds summarizes the modern trends for which the school must provide, declaring: "Changes in teaching methods require larger classrooms. The traditional 20 feet by 30 feet space needed for fixed seating does not provide for a great variety of learning activities today. Informal group discussions call for movable furniture, and a room at least 22 by 35 feet. A sink, workbench, display table, bulletin boards, adequate storage space for books and educational equipment, have all become necessities to the daily job." (46, p 41) Hynds later adds the needs for larger sites, repair rooms, furniture storage, additional locker space, and provisions for medical services and cafeteria.

The process of planning school plants is commonly accepted as a cooperative function of the community and school personnel. This process was utilized in Detroit, Michigan. As a result, the Detroit Citizens Advisory Committee recommended to the Detroit Board of Education in November, 1958, certain changes in the educational program. These changes, when grouped together, would have resulted in great and sudden alterations. The changes that have been approved by the Detroit Board of Education have certainly had an impact upon, or have been thwarted by, the individual school plants in the Detroit School System. This contention is re-inforced by the acceptance by the Detroit Board of Education of a grant from the Ford Foundation to study the modernization of school plants in 1960.

The problem of this investigation is the direct outgrowth of the activities of the Detroit Citizens Advisory Committee and the Ford Foundation grant. Greater clarification of the problem is provided,

in part, in the two succeeding sections of this chapter, namely: (a) Rationale for Educational Adequacy, and (b) Definitions of terms. Delimitations, assumptions, and hypotheses are added to complete Chapter I.

RATIONALE FOR EDUCATIONAL ADEQUACY

The Rationale for Educational Adequacy provides a theoretical background for evaluation of school buildings and is presented as a parallel between the effectiveness of a teacher and a school plant.

Learning is a complex process. The learning process is active under many and varied conditions. The extent of activity, intellectual or manual, is broadened and deepened when the potential is challenged. Certain teachers possess the capacity and ability to spark the learning potential of their pupils. These teachers anticipate individual needs and make definite plans and provisions to encourage this potential. All pupils, however, do not respond to encouragement to utilize their potential; some respond sporadically; others respond in selected spheres of learning; still others respond almost completely. But the pupil who is not offered the opportunity to respond with his potential is somewhat thwarted in his learning process. The teacher who anticipates the needs of the pupils and assists in releasing the pupils' potential is more adequate than the teacher who does not. Certified teachers are not entirely adequate nor entirely inadequate; they would lie on a continuum between the extremes. The teacher is, further, a product of the educational philosophy of her time. Some teachers continue to grow and adjust

to improved philosophies, others remain stagnant with the philosophy of an earlier era.

The principles within this briefly sketched theory of learning can be applied to school plants. The school plant that allows for the release of both teacher-instructional and pupil-learning potential is more educationally adequate than the plant that thwarts, restricts, or impedes that potential. The more adequate plant was erected and designed with a greater emphasis upon the anticipated needs in the learning process. The educational potential of an adequate school plant may be fully utilized, remain dormant, or lie at any given point between the two extremes. The teachers and pupils in an educationally inadequate plant will be unable to realize as great a release of their potential as in an educationally more adequate structure. The ideal plant would be the plant that made allowances for a complete release of the learning potential of all concerned. Few plants, if any, attain this ideal. In the absence of an existing ideal, the ideal must be envisioned. School plants are then compared with this ideal. Because of the absence of a plant which is "educationally ideal," we turn to an analysis which considers a plant in terms of being "educationally adequate." With an ideal envisioned, school plants will be more or less educationally adequate as they meet the criteria of release of the learning potential as originally determined by an anticipation of needs. Plants will vary in their educational adequacy largely on the accuracy of these projected or anticipated needs; this applies particularly to any plant constructed at any time prior to today.

The educational philosophy prevailing at the time of erection of a plant most certainly influenced such decisions as, for example, size of classrooms and provisions for special education; these decisions may differ from decisions which would be made today. We should focus our attention, however, upon the educational adequacy of a plant for a current learning theory. School plants should be educationally adequate to release the potential of pupils and teachers today while concurrently anticipating the needs of tomorrow.

In summary, the extent to which a school plant operates effectively depends upon the relative adequacy with which it facilitates or impedes desirable educational activities in the program of the school.

DEFINITIONS OF TERMS

Definitions of the most vital terms of this investigation follow:

1. Analyze
   a. To compare the educational adequacy of a public elementary school operating under a base educational program with the educational adequacy of the same school plant operating under a modified educational program.
   b. To compare the differences between the educational adequacy of one school plant, or a group of school plants, with others.

2. Educational Adequacy

   A measure of relative worth or value of a school plant for educational purposes based upon specified functions. Specifically, it is the score recorded by a rater of a specific school plant or group of school plants.

3. School Plant

   Those elements within a specified school attendance area designated by the Detroit Board of Education for educational use, including the school building, school site, facilities, equipment, and temporary (portable) classrooms.

4. Base Educational Program

   The educational program operative prior to the approval by the Detroit Board of Education of the recommendations of the Detroit Citizens Advisory Committee. Also simply termed "Base Program."

5. Modified Educational Program

   The educational program operative after the approval by the Detroit Board of Education of the recommendations of the Detroit Citizens Advisory Committee. Also simply termed "Modified Program."

DELIMITATIONS

The following delimitations assist in establishing the frame of reference under which the investigation was conducted:

1. This study is concerned with the impact of program modification upon school plants. It is not concerned with

the cost of school programs, extent of program utilization, quality of school plants, operation or value of a citizens advisory committee. This study, further, does not attempt to prove any theory or the existence of any educationally ideal school plant.

2. This study is concerned only with selected elementary school plants in the Detroit, Michigan Public School System.
3. Only elementary school plants housing grades K-6 are included in this study.
4. The condition of base and modified programs was determined by studying prepared materials and by interviewing personnel of the Detroit, Michigan Public School System.
5. Only those items and functions of the data-gathering instrument are evaluated as being affected by program modification.
6. The data-gathering instrument was applied in the summer of 1960 to the school plants compatible with this study.
7. This study examines fifteen school plants, broken down into three groups each containing five school plants in the following categories:
   a. "old" plants - erected in 1912 or earlier.
   b. "middle-aged" plants - erected between 1920-1929 inclusive.
   c. "new" plants - erected in 1945 or later.
8. No control section in the sense of traditional experimentation was provided for in the present investigation. The experimental design was planned to measure the relative impact of program modification on school plants; each group and plant was, in effect,

both a control and an experimental group in relation to the others.

9. Replication was not provided for in the present experiment. Replication could have been provided by duplicating the experiment with a second evaluation of the same plants, by repeating the experiment at a subsequent time, or by altering the present design and using the present subjects. A replication would have enhanced any problems encountered and would have increased the cost of the experiment in time and money. The decision was made, therefore, to maintain the design in its present form and accept the limitations of no replication.

ASSUMPTIONS

The assumptions underlying this study are:

1. The educational adequacy of a school plant is one of the best possible measures of its relative worth or value for educational purposes.
2. The Landes-Sumption Citizen Workbook for Evaluating School Buildings is a valid and reliable data-gathering instrument for measuring educational adequacy.
3. The Landes-Sumption Citizen Workbook for Evaluating School Buildings, as revised by the Detroit Board of Education, is a valid and reliable data-gathering instrument for measuring the educational adequacy of the Base Educational Program.
4. Educational Adequacy varies among school plants.

5. Program modifications effect the educational adequacy of school plants.
6. The educational adequacy of a school plant varies over time.

HYPOTHESES

Modern experimental procedure usually concerns itself with the purpose of testing a hypothesis: accepting the positive view that there is a true difference among the experimental treatments as far as the criterion is concerned, or rejecting the "null" hypothesis that no true differences exist. In the present design positive hypotheses are formulated for test on the criterion measures. These hypotheses are:

1. The educational adequacy of existing school plants is significantly different as a result of program modification.
2. The difference in educational adequacy resulting from program modification is significantly greater for middle-aged school plants than for new school plants.
3. The difference in educational adequacy resulting from program modification is significantly greater for old school plants than for new school plants.
4. Items and functions can be identified which are the major cause of the difference of educational adequacy of school plants resulting from program modifications.

CHAPTER II

REVIEW OF LITERATURE

The nature of this investigation requires a review of more than one field of literature and research. The three major aspects of this investigation are physical school plants, curriculum, and "change." It was therefore decided to present this review of literature in three sections, namely: (1) Evaluation of School Plants, which is largely a review of literature and expert opinion concerning elementary school plants; (2) Curriculum, which is concerned with the Detroit Platoon System; and (3) Change in Education, which is an exposition of studies on change and adaptability in education.

EVALUATION OF SCHOOL PLANTS

Subjective evaluation of school plants has persisted since the erection of the first classroom. In the United States, we waited until the 19th century for the beginnings of systematic efforts to assemble information about the satisfactory physical facilities for schools. In 1838 Henry Barnard, then secretary of the Board of Commissioners of Common Schools for Connecticut, prepared a series of papers on the subject of "school architecture" which he later published (5). He assembled information on the condition of "school houses" in the few New England states where public education had then received sufficient attention. He noted that some architectural improvements had been made to remedy the deficiencies of "school houses," but the general level of sufficiency was still low. Since that time the

concepts of education have changed, the importance of education has increased, and the problems of providing satisfactory physical facilities in schools have mounted in magnitude and complexity.

Evaluation of school plants can now be undertaken for various specific and general purposes. These purposes include the evaluation by: the engineer, whose primary concern is materials of construction and their use; the architect, whose primary concern is design of plants; many disciplines to bear upon such subjects as human vision, and various conditions of physical environment; and the educator, for educational research.

The educational community itself has produced considerable research on unique problems of school buildings. There have been numerous studies on: (a) evaluating or determining the adequacy of physical facilities for educational purposes; (b) assessing services related to the operation, maintenance, and management of educational facilities; (c) determining features of various spaces in buildings so that they may best accommodate the educational activities to be assigned to them; and (d) planning educational facilities so that they will be of the proper kind, of the right amount, and in the right locations for efficient use.

Many areas of school plant and equipment lend themselves to objective analysis. On the other hand, such phases as "planning" and "designing" require a type of ingenuity and inventiveness which is a synthesis of science, art, and business. Many of the most authoritative general treatises on the subject of school buildings and equipment are primarily non-research efforts, despite the fact

that they are based heavily upon research. Among general publications which are research-oriented, yet strongly colored with either the imaginative qualities of the architectural designer or the creative perspective of the educational planner, are those by the American Association of School Administrators (1), Caudill (8), Engelhardt and others (34, 36), Herrick and others (44), MacConnell (51), National Council on Schoolhouse Construction (57), and Sumption and Landes (80).

Guiding Principles and Objectives

The guiding principles and objectives in evaluation of school plants vary according to the desires and priorities of individual communities. Most commonly, however, top priority is given to safety and health of youth (7, 55, 64, 68); secondary importance is commonly placed upon the educational environment (55, 64). Strevel and Burke have itemized the major considerations of school studies; they are summarized below:

1. Increased pupil enrollments.
2. Substandard conditions of high utilization facilities.
3. Facility shortage.
4. Unsanitary and unsafe condition of existing facilities.
5. Substandard elementary school facilities as substitute to costly high school facilities.
6. Satisfactory space in elementary school over excessive space in high school.
7. Old buildings in older sections of the service area.
8. Unsatisfactory environmental condition of site and structure.
9. Desires of pressure groups.
10. Site problems causing inaction. (79, p 221-2)

By scheduling these considerations, plant evaluations may satisfy the objectives of the short and long range school plant needs.

Criteria for Evaluating School Plants

Over the years the criteria for evaluating a school plant has been accumulating and compounding. Today, criteria are supplied by legal statuates, professional organizations (1, 51), educators (40, 44, 51), local communities, and many others. Only those criteria most directly connected to elementary school plants will be covered in this section.

Contemporary evaluation of a school plant has been oriented more toward educational endeavors. This current orientation has been spurred on by an altered educational concept and our amassing of educational research. The major conceptual changes are reported in the Encyclopedia of Educational Research as "(a) an extension of the purposes of education. No longer is elementary education viewed as simply the mastery of the 3 R's....(b) a re-examination of the learner and the learning process. Current learning theory emphasizes interest, motivation, experience, and activity. This is in contrast to the traditional ideas of education by processes of assign, study and recite....(c) more rational approaches to the organization of educational experiences. Our efforts to accommodate in schools...differences in human characteristics have lead to such devices as ability grouping.... and specialization of courses. There has been an intellectually convincing counter-movement toward integration---the organization of instruction so that learnings are tied together" (3 p 1010).

Many changes in physical facilities may be attributed in large part to the foregoing and other similar changes in educational thought. Foremost among recent developments is greater simplicity (52, 82). There is less emphasis upon exterior ornamentation and huge costly spaces such as auditoriums and gymnasiums. The conventional scheme of vertical combinations of two or more stories of tiers of standard classrooms in one single building block is giving way to less compact plans. New buildings feature flexibility and expansibility to accommodate a variety of activities within the program and possible future changes in the program and the levels of students to be housed in them (71). There have also been several experimental re-examinations of the interrelationships of spaces in the planning of a school. Such interrelationships include those of school site to community, building to site, components within a school, spaces within components, and spaces within rooms. School sites are larger, not only to accommodate less compact structures but also to provide recreational and educational areas out-of-doors and spaces such as off-street parking not formerly considered important (13, 43, 73). Herrick and others claim that teaching areas themselves are larger, more flexible and have more free flow space; this is in contrast to the old "standard classroom" of 660 square feet which was developed to accommodate 35 pupils in five rows of seven desks each (44). Classrooms themselves have become much more convenient for schools with modern varied programs. The

term "learning laboratory" has been used to describe this change in classrooms (37). The gradual decline of departmentalization in favor of the common learnings approach has produced the "self-contained" classroom (44, 51). Furniture has also been affected by these new ideas in education. Today furniture consists of movable desks and chairs; there is more convenient storage, less chalkboard, and more tackboard and display space; there is greater attention to the detail of appurtenances in classrooms such as sinks, reading and project alcoves, utility outlets, and accessories for instructional aids; the development of educational television has brought about special provisions in buildings for use of this medium (77). There has also been more attention to the internal environment which buildings provide. By means of more use of glass, the outside is brought in and the inside looks out. By imaginative use of cheerful colors and interior materials, some classrooms are made more appropriately stimulating, buildings generally more pleasant. Seeing conditions and atmospheric conditions have been enhanced by both mechanical improvements and experimentation with structural design (9). Finally, among the more noticeable trends in school construction itself are: elimination of basements; use of roofs which eliminate heavy partitions; repetitive rigid frame structural units of steel, wood, or concrete; employment of light, thin, removable, non-load-bearing partitions; speedy erection techniques; modular basis of design; better acoustics; use of materials economical as to both

initial price and ease of maintenance; pre-formed parts and assemblies; and omission of parts of costly interior finish of walls and ceilings. (1, 8, 71, 74)

Procedures

The objectives of a plant evaluation dictate, among other aspects, the procedures to be followed.

The most common, traditional, and systematic evaluations have been performed through the use of a score card or rating form. Among those who have published school-plant survey guides are Strayer and Engelhardt (79), Pruett (69), Holy and Arnold (45), Landes and Sumption (48), and Linn and McCormick (50).

The American Association of School Administrators, pointing out the use of these score cards, states, "Although no completely objective yardstick can be applied to a particular building...there are available a number of school-building score cards, most of which are based on 1,000 points for the so-called perfect school building. These score cards provide for evaluation of approximately 100 different items having to do with the site, the building structure, the classrooms, special rooms such as ...laboratories, general service rooms, and service systems. Although the application of a score card to a particular building is subjective to a considerable degree, if the same persons apply the card to all the buildings in a school system, the relative worth of the different buildings is fairly accurately obtained." (1, p 58)

Engelhardt and Engelhardt's school-plant-survey experience, based upon application of the value point system "... suggests that a score of 900-1,000 indicates a highly satisfactory degree of construction and equipment. In fact, in only a few minor respects does such a building deviate from acceptable standards. A rating between 700 and 900 points is satisfactory. It should be studied in the light of its component parts. ....A score of 600 to 700 points has meant, as experience in these surveys points out, that considerable alteration was needed before buildings could be brought to a satisfactory standard of efficiency. Buildings that have scored 500 to 600 points have proven to be unsatisfactory and yet not so far gone but that extensive repairs and replacements could make them reasonably habitable. When the scores of buildings have fallen below 400 points, it has been the universal judgment of those who have applied the score card that speedy abandonment of the building for school purposes was the only justifiable course to be followed." (35 p 307-308)

And...

> "From time to time descriptive ratings have been applied to the numerical values given to buildings on these score cards. Among them are the following:
>
> | | |
> |---|---|
> | Excellent | 85 or more percent of maximum score |
> | Good | 70 to 84.9 percent of maximum score |
> | Fair | 55 to 69.9 percent of maximum score |
> | Poor | 40 to 54.9 percent of maximum score |
> | Unsatisfactory | Less than 40 percent of maximum score" (1 p 59). |

These basic score cards may be supplemented by subjective, paragraphic reports (64) or supplementary check lists of substandard characteristics (79 p 129).

In recent years there have been strong advocates of "cooperative evaluations." Citizens groups, boards of education, administrators, faculties, architects, and educational consultants all may have important functions to perform in evaluation; but these roles must be suited to local conditions and cooperative evaluation depends upon available leadership. (83) On the other hand one source declared..."The best method of assessing the resources of existing facilities is a thorough field inspection by specialists and others." (3, p 1022) And as to the competence of raters, Taylor and others, declare that descriptions of good and bad educational buildings are probably as useful as score cards for briefing untrained persons in evaluating existing buildings. (81)

Summary of Evaluating School Buildings

Evaluation of school plants has existed since the erection of the first classroom. Since that time the plants have been greatly altered and evaluations have kept pace by incorporating new and sharper standards.

The guiding principles of evaluation vary with the purpose of the evaluation. The most frequent initial principle appears to be health and safety. The second most frequent principle is educational adequacy.

Criterion of evaluating buildings has evolved through the years through contributions of legal statuate and educators. The evolving educational concepts have modified many aspects of structures. The most obvious trend is simplicity in ornamentation.

The procedures of evaluation of the past have been largely centered upon the utilization of score cards. These cards have been given point values up to 1,000 points which would be the ideal, perfect building. Currently, the practise of teams of evaluators working together appears to be gaining highest regard.

CURRICULUM

Curriculum broadly conceived includes all the learning experiences of youth. Providing these experiences may be roughly termed vertical and horizontal organization.

Vertical organization typifies the ungraded or non-graded organization. The horizontal organization reflects the separation of classes according to subject fields, which is known as departmentalizing. Platooning is a system of departmentalizing wherein students move from room to room for different types of activities. The educational organization in Detroit is an example of the horizontal organization at the elementary level. The following paragraphs will discuss at length a program in Detroit known as the Detroit Platoon System, or more recently, the Detroit Plan.

Detroit Platoon System

The Platoon System evolved, along with a number of other school plans, between 1910 and 1920. This manifested an effort to interpret functionally the New Education as developed by Rousseau, Pestalozzi, Froebel, Herbart and later, John Dewey. The second ingredient in its

enthusiastic acceptance was the attainment of maximum use of the school plant for housing the ever-increasing pupil population.

Educational progress in the twentieth century has been the result of forces set in action in various ages in the past, plus new forces generated and made effective amid the complex conditions of present-day social and industrial life.

Rousseau in the eighteenth century held that education is life and that it begins and ends with the individual. Pestalozzi, following in his footsteps, saw that individual growth must come from within, through a child's observation and sense-perception, not through mechanical memorization. Froebel realized that the starting point in education is a child's inherent tendency to act, and that the curriculum must be the epitome of world experience. He also believed that the human infant must come into his racial inheritance through social participation. Herbart's aim was to develop personal character as well as social usefulness, and his followers organized a scientific technique of instruction and set up certain principles of curriculum-making.

At the opening of the twentieth century, John Dewey began to interpret contemporary social and industrial changes in terms of a new philosophy and a new psychology. In his book The School and Society, published in 1899 (27), he proposed the theory, "The school should be life, not a preparation for life." Through the instrumentality of an experimental school he sought to demonstrate that it is possible to order the curriculum and the work of the school in such a way as to make it a miniature of life.

The curriculum of the "New School" was idealistically to be developed in terms of "Socialization, Vitalization and Individualization." The Platoon System had precedent in the trend since 1900, then, and began to "Departmentalize," ---a phenomenon inspired by industrial organization on one hand, and a rapidly expanding curriculum on the other.

In his volume, The Platoon School, Mr Spain, then Deputy Superintendent of Detroit Schools, justifies in theory the thinking which produced, in a short time, a rather complete metamorphosis in the elementary cycle in Detroit:

> This dissertation undertakes to submit to acid test a new type of school organization, the platoon school. It recognizes the curriculum to be merely the outcome of varied and diverse social forces. It views the organization as the mechanical device through which the curriculum finds expression. It conceives the school building as the physical environment in which the curriculum and organization may function.
>
> This discussion is concerned with the genesis of the twentieth century curriculum and with an analysis of those social factors which have produced it. It is concerned with the nature of the twentieth century school building as the lineal descendant of the simple and primitive structures of an earlier day. In a word, it aims to discover how the platoon school squares with the past.
>
> This treatise also seeks to determine what measure the platoon school serves the present. It undertakes to inquire whether its curriculum reflects those social ideals and aims which are most worthwhile; whether as an organization it functions in harmony with sound principles of philosophy, psychology, environment conductive to the health, happiness, and progress of the children; whether its educational product is of high standard; and whether its varied activities and facilities can be provided without imposing an unreasonable financial burden upon the public.
>
> Finally, this thesis contemplates the platoon school in the light of the future trend of educational thought. It recognizes that certain influences are now at work which, at no distant day, may profoundly modify both theory and practice. It raises the question whether the curriculum, organization, and architecture of the platoon school are sufficiently flexible to lend themselves readily to those readjustments which the future is certain to bring.

> The present study is the outcome of an attempt to reconstruct a large elementary school system in terms of twentieth century ideals and needs. Whatever measure of success has attended this undertaking has been due to the cooperation of many people --- teachers, principals, and supervisors --- to all of whom the author feels under obligation.
>
> At every stage of its evolution, the curriculum of the elementary school has reflected the changing needs and ideals of society. The school is under constant pressure from individuals and organized groups who seek to expand and modify the curriculum in response to real or imaginary social needs. In this manner various influences, religious, educational, social, and industrial, have from time to time brought about changes in the subject matter of instruction. While the school as an institution has been conservative and has responded tardily to progressive changes in other fields of life activity, it is nevertheless true that the evolution of the school is the evolution of society itself. (76, p 1-2)

Developmental Phase of Detroit Platoon System

In 1910, the old grammar school type of organization, or some modification of it, was strongly entrenched. Starting with that year many cities in scattered localities began to experiment with reorganization.

Credit for the pioneer experiment in the readaptation of the school plant and organization to the modern curriculum belongs to William S. Wirt of Gary, Indiana. His experiment is especially noteworthy because it inspired the efforts of many other later experimenters. When Mr. Wirt took charge of the schools of Gary, he found a city which had little or no past and consequently no traditions. In this situation he was able to put into practice theories which he had previously tested in a smaller way in Bluffton, Indiana.

The general scope of the Gary Schools in effect describes the Platoon System's purposes:

> The Twentieth Century public school saves the taxpayers money by providing, first, classrooms, and libraries where the child can study books and recite from books; second, playgrounds, gymnasiums, and swimming pools where the child can play and secure a general physical training; third, shops, gardens, drawing-rooms, and laboratories where the child can work and learn to do efficiently many things by doing them; fourth, an auditorium where by lectures, recitals, dramatization, phonograph, player-piano, stereopticon lantern, and motion pictures the visual and auditory education of the child may be done efficiently. Four separate and distinct places are provided for each child, but the total per capita cost is not increased four-fold...Each child can be in only one of the four places at the same time. The new school so arranges the classes that different sets of children are in the four departments all of the time. (59, p 493)

Following this Gary Plan, Mr. S. O. Hartwell of Kalamazoo, Michigan started the plan there in 1915. (41)

In 1918, Detroit began experimenting with the Platoon System. Prompted by the above plans, when two new school buildings with auditoriums and gymnasiums were opened in Detroit in September, 1918, a modified type of organization was tried experimentally. In planning the new organization, the following aims were kept in mind:

"1. Some activity--work, study, or play--for every child, every hour of the school day.

2. A school plant as nearly as possible 100 percent efficient.

3. Adequate time and suitable conditions for effective instruction in the three R's.

4. Ample time and suitable physical environment for daily health education.

5. Special teachers and facilities for instruction in health, music, art, literature, science, manual arts, and home economics.

6. Development of the auditorium as new socializing and correlating unit of the school.

7. Establishment of a library as an integral part of the elementary unit in the school." (66, p 200)

It was spectacular, in a system the size of Detroit's, that in five years a plan calling for complete reorganization of equipment, room use, teaching personnel, and distribution of classes could have been realized. Many timely events converged to explain the installation:

"1. The 20's were, economically speaking, extravagent years. A slack building program during the war years had dammed up the need for new facilities. The opening of the dike gave needed support.

2. Detroit had a new superintendent - young, aggressive, ambitious and with much political aplomb.

3. Many Detroit administrators felt it was time for Detroit to be 'Out-in-front.' The Platoon System provided the vehicle.

4. Functional architecture was coming into its own in homes, factories, and buildings.

5. The building program encouraged change - almost for itself.

6. Increased population meant housing large numbers of children efficiently and comfortably." (66, p 203)

Detroit Platoon Organization

The distinctive feature of the platoon school was the division of all of the school classes into two large groups, or platoons, alternating between the "home rooms," where the three R's are taught, and the rooms for special activities, where children receive training in the social, ethical, physical and vocational phases of life.

For the ninety minutes in which the classes of one platoon are in the home room receiving instruction in English, spelling, arithmetic, reading, and penmanship, the classes of the other platoon are found distributed among the activities of gymnasium, play, auditorium, social science, literature, art, music, library, and household arts for three thirty-minute periods. The alternating of the platoon in the middle of the morning and the middle of the afternoon divides a six-hour day into three hours of home room work and three hours of special activities for every child. With this plan of interchanging, all the space and all the facilities of the school are brought into play at the same time, thus giving the benefits of all the departments to all of the pupils. (66, 76)

Each principal in Detroit, from 1920 to 1930, made a study of his building, was advised from the central office as to structural possibilities, divided his pupil population into 10, 12, 14, etc., (up to 30) even groups according to pre-determined class size, took a sample schedule of time-allotment or period-distribution, and constructed a new schedule for the building with the desired sequence of pupil's work and equalization of the teacher's time. The "special classes" included some of the following: auditorium, literature, play, gymnasium, music, art, social studies, manual art, and library. Children passed into these rooms for instruction in a fixed order, for a definite number of minutes, and by sections. This was a program for a half-day. The remainder was spent in a home room for instruction in basic learning skills. (66)

Only those schools remained off the platoon plan whose enrollment did not justify division into ten parts. Most of the schools joined the plan partly because administrators wanted to be "in the swing," and partly because the non-platoon or traditional schools were made to feel outmoded.

At every stage of their development, the platoon schools were studied and checked. The Department of Educational Research, under Dr S. A. Courtis, tested and measured pupils in the tool subjects twice each semester and ran a series of tabulations. The platoon school in every standardized test showed results as good as or better than results obtained in the traditional schools. (76, p 166-192)

Evaluation and conversion went on slowly and the number of platoon schools varied between 1925 and 1935, only as permissive enrollment varied. The innovation continued 100% where possible, not as a matter of conviction as much as a matter of acceptance.

The Emerging Detroit Plan

Between 1935 and 1945, a series of trends began in some degree to damage the spotless reputation of the platoon system. These were aggravations of some difficulties foreseen in 1924 by Mr Spain, namely:

> "While the reorganization of the Detroit Elementary school system has progressed amid the overwhelming approval of teachers, pupils, and the general public, it has aroused some opposition, and certain controversial questions have arisen which in fairness should receive consideration here.
>
> Some of these questions have been raised by those who are opposed to all innovations; some by those who still labor under a misunderstanding of the situation; and still others by those whose children may have had unpleasant personal experience with principals or teachers of platoon schools.

"These questions are in the main inconsequential and can be answered by correcting administrative maladjustments.

Other questions which have been raised are fundamental and some of them strike at the validity of the principles upon which the platoon organization rests. These will be considered in detail.

1. Does not the platoon school organization make project teaching almost impossible because of its departmentalization?
2. Do not pupils in platoon schools lose the personal touch?
3. Are not pupils in platoon schools under a nervous strain?
4. Does not frequent change of classes waste time and cause disorder?" (76, p 51-2)

A number of trends contributed to the questioning of the platoon system. The validity of the intelligence test, for instance, came under scrutiny. Psychologists began to doubt that it was definable, static, or that intelligence tests were so constructed as to test intelligence. If one believed this, it invalidated many tested hypotheses.

The publications of Gestaltists also gave life to the popular conception of the manner in which children learn. If one believes children learn in large areas or fields of association, and therefore subtract tools and skills from this point, the separate isolated subject-learning becomes an anachronism. Concomitant is the conclusion that the usual standardized test at the elementary level does not test that which it purports to test, nor are the conclusions derived from the testee's proximity to a norm justifiable.

A third trend emerged with the advancement by many educators of the theory that there is only one goal for the child younger than twelve--the goal of good citizenship in a democracy--and that any teacher worthy of the name could handle that instruction.

The emphasis was placed upon "integrated learning with one teacher as a guide", and hence, specialists would hardly be needed except as contributive agents. This theory becomes disturbing to those who believe that only a science teacher can teach science, for example, and that a child can and should learn science as a tool. The platoon school directly contradicted this theory of integrated studies.

A fourth and perhaps the greatest single factor in the newer concept was the rise of the psychiatric viewpoint: the accent on mental health, the publicity of the Cornelian Corner group, the emphasis on good human relations, the analysis of child performance by men like Gesell, and above all the wide credence given the research results of experimentation determining how children's needs affect learning.

The final trend finds many educators advocating the small, community-imbedded elementary school, organized into self-contained classrooms with all teachers merely resources aiming toward efficient, adequate, life-experience in a democracy, regardless of age.

Because of these trends, peripheral repercussions in Detroit may be enumerated as stated by Perry:

"1. In 1943-44, an association of parents rose to organize under the title, "Better Schools Committee," to urge for reconstruction within the framework of the present system by whatever pressure need be. These tend to advocate the 'self-contained classroom,' in an aggressive way.

2. The Citizenship Study, a research project in Detroit, was launched in 1943. For five years its staff trained teachers in individuation, group processes, techniques for answering emotional needs in building ideals and attitudes, democratic participation, teacher-pupil relationships, always with good citizenship a total end. The vestiges are giving many school teachers food for thought.

3. The core-curriculum plan is under experiment in five schools.

4. A committee formed in 1936 made a series of changes in the original platoon plan including: (a) the addition of a conference period meant for guidance and counselling; (b) the introduction of science throughtout the grades; (c) change in the time schedules for easier more integrated operation; (d) the integration in one room of the language arts; (e) elimination of study periods in social science in the homeroom.

5. In 1948, the building program as envisioned by the Board of Education gave evidence of a trend toward smaller elementary schools, serving a smaller area in a close, intimate exchange of services with the community.

6. In the same year the Superintendent gave permissive direction that provided for the removal of grades one and two from the platoon structure where feasible, possible or desirable. Nine schools in the platoon effort are experimenting.

   (A survey taken among teachers in 1945 indicated that 68 percent thought grades one and two should be removed from the platoon plan. A committee to consider the problem declared it administratively impossible to do so.) (76)

7. Because of the changes occurring within the system, the Board of Education as of 1950 has officially eliminated the name Platoon System, in favor, nominally, of the 'Detroit Plan.'" (66, p 207)

The "Detroit Plan" was defined as late as November 9, 1959, in a letter from the school housing division to the Superintendent, under the Subject: Relationship of School Organization to Planning School Buildings. (16) That definition read:

'"Detroit Plan' will refer to any plan of organization under which a single homeroom is the base of operations for two groups, each of whom occupies the room for a half day, while it divides the other half day somewhere else. The other half day may be divided

into one or six parts dependent on how special subjects are divided or grouped. Traditionally Detroit divided the half day into a large number of specialties, but in recent years it has experimented with larger subject-matter groupings. When all special subjects have been grouped together, the result is sometimes referred to as paired classrooms, or the co-operative plan. For the purposes of our definition, any combination or degree of grouping is defined as the 'Detroit Plan.' It is quite possible to organize teacher service so that a group of students with a teacher use several rooms and have the basic teaching values of self-contained, but we shall call it the 'Detroit Plan' simply on the basis of room organization."

Citizen Advisory Committee Effects Curriculum

In February, 1957, in the face of a serious lack of facilities, shortage of staff, and significant social changes, the Detroit Board of Education established the Citizens' Advisory Committee on School Needs. This Committee studied areas of education proposed by the Board of Education, namely (11 p 9):

"1. School Program (Curriculum)
2. School Plant
3. Personnel
4. Community Relations
5. Finance."

To carry out the charge of the Board of Education, the Committee resorted to these activities (11, p 10):

"1. Interviews with school personnel, civic leaders and school officials in other communities.
2. School visits in Detroit and elsewhere.
3. Meetings with consultants.
4. Coordinating efforts with regional committees and their sub-committees.

5. Reading and research.
6. Questionnaires and surveys sent to school personnel, professional and civic organizations.
7. Meetings with parents and students."

The Citizens Advisory Committee in November, 1958, submitted 183 recommendations to the Board of Education. By December 7, 1959, 141 recommendations were "approved" by the Board, 5 recommendations were "approved with amendments," and 37 were referred for further study; none were rejected (18). A document entitled One Year After (18) summarized the recommendations pertinent to this study categorically as follows: School Program (Curriculum) (p 21-32, 35-38); School-Community Relations (p 61-74); School Plant (p 75-89). Those recommendations which were approved resulted in major modifications in curriculum, public relations, and physical facilities in Detroit. These recommended improvements are briefly summarized as follows:

1. The first and second grades---and the third where it is deemed advisable---should be placed in self contained rooms. In grades beyond, a modified self contained plan should be progressively adopted.
2. The present programs in reading, writing, spelling, mathematics, and science should be intensified.
3. The libraries should be expanded and classroom libraries should be encouraged.
4. The audio-visual aids program should be expanded.
5. Educational opportunity should be equalized in terms of equipment, service, and curriculum.
6. Counselling services should be expanded.

7. The preferred school size should range between 600 and 800 pupils.
8. Greater attention should be given to adopt to changes in curriculum.

Summary of Curriculum

As a result of John Dewey's interpretation of the purposes for which children learn, several school systems experimented with different forms of organization between 1910 and 1920. One of the experiments started in Gary, Indiana, under the title of "The Platoon System". In 1918, Detroit experimented with the program and later adopted it.

Due to the influence of the Gestaltists, and others, there has been a tendency since 1930 to question the advisability of having elementary school age children meet so many different specialists in subject matter areas during the day.

Modifications in Detroit have become so numerous that school officials now prefer the term "The Detroit Plan" rather than "The Platoon System." The platoon movement seems to be on the decline. This decline has been sharpened by the activity of the Detroit Citizens advisory Committee in the later 1950's, and the recommendations of this group which were approved by the Board of Education.

This section of curriculum is followed by a description of studies of change in education.

CHANGE IN EDUCATION

The history of American education depicts constant change. The National Society for the Study of Education (55) in 1926 presented an excellent treatment of the historical development of the curriculum and of the educational forces that have shaped it. Categorically, Stuart Noble (15) in 1954 presented a discussion of the religious, economic, political, and cultural forces that have created our educational systems.

Rigorous studies of these changes are conspicuously absent. The absence is largely due to our inability to define and measure the broader qualitative aspects of the educational enterprise.

The studies which have been conducted constitute an area of growing concern, and, though often lacking in desirable experimental sophistication, very often provoke controversial evaluation by those concerned. Such is the case for the studies of change that follow.

Studies of Change in Education

Drs. Paul Mort and F. O. Cornell of Columbia University receive credit for a pilot study in the field of the measurement of adaptability or change of school systems, by means of tracing flexibility in accepting new ideas.

In 1937, Drs. Mort and Cornell (52) studied 344 school districts in Pennsylvania in an effort to measure "adaptability." The instrument used was a research questionnaire, entitled The Growing Edge, and was personally prepared by field workers. Nine adaptations, analyzed minutely and charted as to time and percent of diffusion, yielded in

part the following conclusions:

1. The first step in an innovation requires five times as much time as any other step.

2. It requires fifteen years for an idea to crystallize into an innovation.

3. The indoctrination period takes approximately ten years more.

4. Fifty per cent diffusion requires thirty years in toto.

5. Ninety per cent diffusion will require another fifteen years.

Dr. Mort concludes that more than half a century usually elapses between the conception of an idea and its 90 per cent diffusion in any given area and that a century is a good guess for a complete cycle. He feels this is exemplary of great lack of adaptability, great "institutional lag."

Dr. Mort measured the 344 communities with two instruments: one, "A Guide for Self Appraisal" for school systems to test adaptability; and another, "The Growing Edge" - a device to detect the presence of a new practice. And he has implied that use of the Time Chart should lead to an estimate of the adaptability of a school system in comparison with the large sampling.

Dr. Mort's conclusions need to be analyzed with the following considerations:

1. All innovations do not fall into one category and, hence, cannot be readily compared, i.e. the reorganization of the high school is hardly similar to homemaking classes for boys, since one may be qualitative and the other quantitative.

2. If innovations are hand-picked, any conclusion becomes valueless if applied to school systems generally.

3. Great variance must occur in two localities with reasons and stress beyond those called "steps in diffusion."

4. Such generalizations as "the beginning step takes three times as long as any other step" in considering nine innovations makes the statements of exact years for other steps rather unauthentic.

Dr. T. M. Pierce of Columbia (60) weighed three factors under the caption "Community Good Will Toward Education", and three others entitled "Conditioners of the Expression of Good Will and Understanding of Education" with numerous sub-classifications.

He concluded that some factors were highly productive of adaptability, i.e.

1. Community good will.
2. Educational level of the community.
3. Classification of business and professional workers.
4. Community density.
5. Tax leeway.

Other less important contributory factors, he concludes, are:

1. Community prosperity.
2. Population.
3. School enrollment.
4. Wealth.
5. Postal receipts.

Dr. F. S. Cillie engaged in a study which attempts a comparison of state-operated and locally-operated school systems in regard to their respective capacities for adaptability, in order to throw the light of evidence on the nature of activities which should be centralized and those which should be decentralized. (9) Dr. Cillie lists hypotheses which infer that the following characteristics flourish in a centralized community:

1. Good teaching personnel standards.
2. School and community agencies.
3. Efficiency of operation.

These do best under decentralization:

1. Flexibility.
2. Individualization.
3. Curriculum change.
4. Building and equipment improvement.

Dr. M. Farnsworth's study of five innovations in New York, Connecticut, and Massachusetts uses Dr. Mort's "Guide" and "Growing Edge" to trace the inventions and describe their infiltration into a cluster of communities. (34) His stress was on educational flexibility where there was mandatory change. His findings (as to methods for diffusion) support the community group plan.

Mr. G. W. Eby pursued a study in St. Louis which used methods similar to Dr Farnsworth's study to measure adaptability in elementary schools. His conclusions are listed here: (13)

1. Where principals have great freedom, adaptability flourishes.
2. Where school systems are metropolitan, adaptability flourishes.
3. Where central administration favors adaptability, it flourishes.
4. Where central administration is conscious of time lag, it tends to shorten.
5. A combination of dominant and contributing factors determine adaptability.
6. Supervisory officers, with traditional mind set, tend to inhibit adaptability.
7. If one level (ie elementary) of a system is adaptable, so are others.

8. Systems which utilize creative resources show level adaptability.

9. Innovations costing money more likely occur where parents are financially able.

10. Shared experience and communication of ideas must be facilitated where there is adaptability.

Dr. Bateman exploits an investigation (5) of the process of change that operates in the adoption of a specific innovation in educational practice, as exemplified by the county-unit system of school districts in the state of Utah. He points out the way in which this adaptation differs from the pattern of development used by Cubberly and Mort, namely:

1. The idea does not appear to have originated from local sources.

2. Its diffusion was not assisted by the granting by the state of financial aid.

The purpose of a study by Dr. W. D. Knott (43) was to test this hypothesis: "Able communities giving more than average support to the public schools provide a rich ground for invention and introduction of adaptations." Communities should therefore be given freedom to exceed the minimum state program.

Dr. Knott used the years 1925-26, 1934-35 and used a check-list type of questionnaire circulated to selected school districts, tracing change in expenditure in the two periods. He applied the "Guide for Self-Appraisal of School Systems."

In general, his study shows that educational adaptations and educational adaptability are dependent upon tax leeway.

Dr. Newell's hypothesis (56) was that a relationship exists

between educational adaptability and class size. He studied three phases: invention, early introduction and diffusion.

Grades 1 - 3 were studied in each of three schools in each of four systems. Classes of less than twenty-five pupils were compared with those of over twenty-five.

Using the Guide and tabulating his findings, he concluded that:

1. A high correlation exists between class size and early introduction of innovations.
2. The correlation is high between size and early diffusion.
3. Small classes accelerate diffusion.
4. All classes should not be of similar size.

Under the direction of Paul Mort of Teachers College, Columbia University, the Metropolitan School Study Council (50) organized a working committee of two hundred fifty members and laymen and attempted to identify and describe what they considered to be outstanding practices in twelve areas of living in several schools.

The school systems belonging to the council were asked to report in what areas they considered their practices as good as or better than any reported in a brochure entitled, "What Education Our Money Buys." The members of the committees visited these schools and described the practices. The result was a compilation of thousands of cards, each with a practice described. These cards were sorted into twelve areas termed "Windows";-under each "Window" there are from five to twelve sub-areas with full definition and explanation, giving a full analysis to each approach. The report adequately presents a philosophical introduction and orients the reader into

hypothesis, analysis, basis, explanation, and goals of examples depicting the technique for acquiring the articulated purposes in one-hundred-one patterns of teaching life. The introductions to the patterns are sufficiently stimulating regardless of whether or not the reader chooses to examine the actual practices in order to change her modus operandi.

The purpose of a study by Mr. Ralph Gallagher (46) was to find what relationships, if any, existed between the group life of the community and the quality of their schools. The results he concludes are: better schools are found in the communities where the schools had extensive contacts with the groups that existed in and around the community. Symbiotic groups have potent relationships to adaptability in schools. His data were from files of the Metropolitan School Study Council of New York, and his tools were:

1. "The Growing Edge" (Mort).
2. Questionnaire (Human equation error).
3. Time sheets.

It occurs to the writer that Mr. Gallagher might be a little optimistic in assuming that "The Growing Edge", in measuring the adaptability of a system, is quite reliable as to the value of "deleted" practices. In selecting fourteen staff factors and nine pupil factors for measuring relationships to the twenty symbiotic groups used in their importance to educational adaptability, Mr. Gallagher was somewhat unjustified unless he used Pierce's study as his source.

The study is carefully done and amply annotated. Its implications in effecting the changes in curriculum that might be desirable are

noteworthy.

Mr. Hedlun's purpose in writing his dissertation (38) measuring public opinion in school issues was prompted by his belief that (1) scientific polling has speeded up the process of democratic action and can continue to do so; (2) that the public can and must be reached by the schools; (3) that public education will rise no higher than the interest and will of the people; (4) that scientific polling methods can be utilized in such a way as to bring the cost down where the technique can be employed by any administrator in any community for changing any aspect of the educational scene.

His techniques included questions of yes-no type, multiple choice, and free expression which were (1) drawn up by teachers and principals in conferences; (2) submitted to five discriminating laymen, and (3) subjected to a field test before the ultimate selection of 164 students who were shown how to get the questionnaires answered and returned.

Mr. Hedlund sets up standards of evaluation on types of polling and types of questionnaires which should facilitate the practice for those leaders who feel the urgency to hasten adaptability in their school systems.

Since the public is a major factor in producing curriculum change, any technique which will accelerate this is worthy of consideration.

Mr. Hedlund's conclusions as to the reliability of this form of sampling might be modified, however, by population mobility, the accuracy of the interviewer, and the co-operative principle working with the interviewee - considerations of which he was undoubtedly aware.

Dr. Voorhees' purpose in writing his dissertation was to trace the development of the position of the elementary principal in Detroit, Michigan, from 1894 to 1941 (78). Since it is common belief that few curriculum changes have been effected except through the administrative office, and that unless those leaders are reached first the teachers to date have little opportunity to attend to new trends except in a minor way, the perusal of Dr. Voorhees' work is of great interest.

Since the thesis is well foot-noted and runs fairly parallel with other histories of education, obviously the author accomplished his purpose and the study is a scholarly one.

Summary

Change in education has been a constant. Historical coverage of change has been recorded in developmental stages and in topical form.

Measurement of change has been crude and difficult to support, yet some studies have been undertaken.

Drs. Mort and Cornell of Columbia University pioneered the measurement of adaptability of school systems in the United States. Their initial study of time of change led to further studies in community, tax leeway, group living, public opinion, and elementary school principals. These later studies have added to our knowledge of change, or adaptability, and provide a concrete stimulus for the continued attempt to evaluate change.

Through an analysis of these studies, it seems justifiable to believe change and invention are initiated by the community, the board

of education, and administrators.

The following chapter will describe the methodology of the present investigation into the change of educational programs as it effects school buildings.

CHAPTER III

THE DESIGN AND METHODOLOGY OF THE EXPERIMENT

There are a number of various design, methods, and evaluation instruments available for the modern experimenter in education. The design of the present experiment employed a four-way comparison design and ranking. The control of extraneous variables by randomization procedures were also provided in the design. In addition, by use of a "t" test, significant differences between and among mean scores of school plants may be determined.

The methods and procedures used in conducting an experiment are determined in part by the experimental design and in part by the physical setting and facilities. In the present chapter a description of each of the following will be presented: the base educational program, modified educational program, population, sample, and randomization procedures.

The experimenter can frequently use existing instruments for the purpose of the investigation, but often it is necessary to construct or adapt available instruments appropriate to the objectives being sought in the study. In the present investigation the measuring instrument was in existence and adapted to the study by the experimenter. The present chapter also contains a description of the evaluation insturments used in the study and a discussion of the collection and recording of data.

I THE DESIGN

The school plants were assigned to three groups as a stratified

random sample. One group was designated the "new" group for plants erected between 1945 and 1960 inclusive. A second group was designated the "middle-aged" plants for plants erected between 1920-1929 inclusive. The third group was designated the "old" for plants erected prior to 1912 inclusive.

The Variables

In addition to the age variable, the variable of the school programs was chosen for study. The school programs were, of course, the primary variables under study. There were an almost unlimited number of factors that could be considered for other variables. Among these were location, pupil levels of achievement, pupil population, number of plant stories, teacher morale, socio-economic effects, and many others. The choice of the number and the particular factors for study in any experiment is dependent upon the purpose and design of the experiment, upon established and conventional practices, upon the interests and preferences of the experimenter, and upon the practical limitations of partitioning the variables. In the present study it was decided that more than two variables would become unwieldly in terms of statistical procedures, practical use, and significance for the present study and for future investigators of program change and school plants. Thus, in addition to the program, it was decided that differences in age of school plants would be the most practical variable to study in terms of the effect of program modification upon school plants and among plants of varying age.

The decision to use three categories or levels for the age variable was made in order to determine any interacting effects that might exist among the variables. The choice was, of course, limited to two levels in the case of the programs.

In the choice of criterion variables the experimenter must make decisions about what effects he wishes to measure and then select or devise instruments to measure these effects. In many cases the choice of dependent variables will be influenced or limited by the types of measuring instruments available, the conditions of the experiment, and the existing facilities. In the present study the major concern was in measuring the effects of program modification on school plants. Two criterion variables were chosen. These were (1) base educational program, and (2) modified educational program.

The use of two criteria was considered adequate to give a variety of measures for determining the impact of the programs and their relationship to the age of the school plants. The criteria selected were realistic in terms of the purposes and conditions of the experiment. The experiment was conducted within the frame of reference of the educational programs of the Detroit Public Schools, the elementary school programs of the system, and K-6 school plants. In addition to the usual criteria of structural adequacy, it was thought important to learn about the effect of the programs within these structures. Likewise, it was considered of interest and importance to note any relationships that might exist among the numerous categories and items that effect a difference in program adaptation among selected plants.

The instrument for obtaining measures of the variables will be

fully discussed in section III of this chapter.

Diagrammatic Plan of the Design

A comparative plan for the program difference was utilized in the present study. Each plant was examined simultaneously for its base and its modified educational programs. The plants were personally visited and evaluated in the cycle of new, middle-aged, and old. It was thus possible to simultaneously measure the main differentiations of the two program variables upon each plant. It was possible, further, to simultaneously analyze a normative base and modified educational program among all the plants and to almost simultaneously ascertain differences among plants and between groups of plants. By using the "significant differences" technique, it is also possible to examine the effects of various comparisons at different levels of each variable and to test various levels of significance of each.

In an attempt to isolate those items, if any, which most greatly influence the differences between programs, the simple ranking technique was utilized. This technique places the items under scrutiny in an order from most active to least active. The most active item would be that item which produced the greatest collective difference between the programs, or, in short, most effected the impact upon the school plants in the present study.

The Control of Extraneous Variables

The design of the present experiment provided a means of control

of many extraneous variables. Differences of subjects introduces many variables into the experimental situation. In many experiments an attempt is made to control these variables by equating subjects on those factors which, it is thought, will bias the results, such as size of plant, pupil population, geographic location, number of stories, additions made to basic structure, special classes available, and many others. It is probably impossible to select and equate subjects on all of the many variables that might affect the experimental results. It is possible, however, to minimize many sources of error or bias by randomization procedures, thus randomizing the uncontrolled error variables among the treatment groups. In the present study the subjects were randomly selected within age groups of new, middle-aged, and old school plants at the outset of the experiment. In this manner any variations and sources of error due to differences were randomized within the three groups. The randomization procedures will be discussed in section II of this chapter.

Differences in evaluators are also a possible source of error in the evaluation of school plants. In the present experiment, by utilizing one person to do all the evaluations, consistent estimates were secured. An additional precaution was introduced by evaluating one plant a day in this order: (1) new plant, (2) middle-aged plant, (3) old plant; thus no group gained special consideration at the beginning or end of the evaluations. Since five days each week were utilized, no group was penalized or rewarded by being consistently rated at the beginning or end of the week.

No control section in the sense of traditional experimentation

was provided for in the present investigation. The experimental design was planned to measure the relative impact of program change on school plants, each group in effect being both a control and an experimental group in relation to the others.

Inasmuch as school plants receive a wide variety of up-keep, renovations, improvements, and climatic experiences it is unwise for the experimenter to assume that all subjects are at the same level initially. In order to control this source of error the control afforded by randomization procedures was utilized.

Replication was not provided for in the present experiment. Replication could have been provided by duplicating the experiment with a second evaluation of the same plants, by repeating the experiment at a subsequent time, or by altering the present design and using the present subjects. Because of time and financial limitations the first two possibilities were not feasible. Altering the design of the present experiment would have resulted in a reduction of the number of subjects for each replication or a reduction in the number of variables for study. Inasmuch as this was an initial experiment of its kind, there was no way of knowing at the outset what problems and conditions would be met during the course of the experiment. A replication would have enhanced any problems encountered and would have increased the cost of the experiment in time and money. The decision was made, therefore, to maintain the design in its present form and accept the limitations of no replication. In the future more refined investigations of a similar nature should provide for replication in the experimental design.

The Statistical Treatment

The "t" test, "F" test, and "signs" test were the principal statistical tools used in the present study. By the use of these tools the experimenter is able to analyze the difference of the experimental variable, test its significance statistically, and statistically determine a direction of data. It is important, however, that the assumptions involved in the use of these techniques be satisfied; or the experimenter cannot be sure that the obtained differences are "true" differences, but rather result from a failure to satisfy the assumptions underlying the use of the statistical tests. The assumptions underlying the analysis of differences are:

1. The groups are selected at random from the same population. This assumption was accepted in the present study on the basis of the randomization methods used and described in the following section of this chapter.

2. The groups are homogeneous in variability. This assumption was tested by the "F" test to discover if the sample means vary significantly from a true mean.

The level of significance for accepting or rejecting all hypotheses was set at the 5% level of confidence prior to the beginning of the experiment.

A system of ranking items by the differences between program scores was also utilized.

EXPERIMENTAL METHODS AND PROCEDURES

The methods and procedures used in conducting an experiment are determined in part by the experimental design and in part by the physical setting. In the present section the base educational program, the modified educational program, the population and the sample, and the randomization procedures will be fully described.

Base Educational Program

The base educational program is the foundation program against which the modified program is measured. Roughly speaking, the base program may be considered the educational program operative in the Detroit elementary schools in 1957.

To justify evaluation of an educational program, it is imperative for a researcher to understand as thoroughly as possible that program's philosophy, objectives, operation, community, and the like; in short, the researcher must grasp the program within the frame of reference of reasonable accuracy. This researcher has attempted to attain a reasonably accurate grasp of the educational program through, (1) general background materials, and (2) material directly applicable to the evaluative instrument. The general background study included: printed materials as partially noted in Chapter II, Curriculum; related applicable materials available in public libraries and the Detroit Board of Education offices; and interviews with numerous individuals within the Detroit school system.

The materials studied which are directly applicable to the evaluation instrument were: (1) a packet of revisions of standards,

by pages, fastened to the evaluation instrument (see Appendix B), and (2) "Supplementary Guide to Citizens Workbook for Evaluating School Buildings" (25).

These materials collectively depict the base educational program. These materials, then, established the standards from which each school plant was evaluated. These standards, however, do not, in all instances, minutely describe scores or ratings to be assigned each evaluative item. Where standards were vague or lacking, this researcher relied upon his judgment or other printed guides (1, 51, 57).

Modified Educational Program

The determination of what constitutes a modified program necessitates decisions in questions such as: What are real changes? What are obtainable changes? What are absolutely new introductions? What are fanciful dreams?

Certainly, evaluation and modification of an educational program is a continuous process. Both sudden and gradual modifications are made. Administrative edicts do not in themselves assure revisions or improvements. One may question whether teachers, instruction, or pupils change at any stage of a modification plan. The prime questions for initiating a study of program modification centers upon the issues of when and where does one establish the existence of true modifications.

This researcher began roughly where the Detroit Board of Education acted upon the program improvement elements selected by

the Citizens Advisory Committee in 1958. Specifically, the beginning was established in December, 1959, with the publication of the booklet, "One Year After" (18), which describes action on the Citizens Advisory Committee's recommendations. This researcher accepts the assumption that the recommendations of the Citizens Advisory Committee that were "approved" by the Detroit Board of Education in 1959 would constitute the core of the modified educational program. This assumption eliminates from consideration those recommendations that were "referred for further study."

This researcher has attempted to discover how these approved recommendations have been representative of true modifications in the educational program. For, surely, it would be insufficient to assume recommendations are effective if concomitant action in operation is absent. This researcher, then, has studied materials and conversed with personnel of the Detroit public schools for evidence of true change.

Certain specific materials were located which reflect the frame of reference of the "approved" recommendations. Included among these are reports of recommendations of educational specifications for elementary schools (17, 21-24, 26), and the Rehabilitation Project. (20) All these materials were published under approval of the Detroit Board of Education between November, 1959, and June, 1960. An additional document entitled, "Educational Program Planning Workshop Report - Elementary Schools" (15) which was not officially acted upon by the Detroit Board of Education as of June, 1960, was nonetheless consulted for general information

within the scope of the "approved" recommendations. These printed materials along with conversations with personnel of the school system and study of plans for new school plants constitutes this researchers understanding of the "Modified Educational Program" in Detroit.

It would be unrealistic to surmise that these "approved" plans, with evidence of implementation, would become operative immediately throughout the entire system. These modifications, therefore, must be viewed as the planned program. Yet, the Detroit school system is moving swiftly to comply with the "approved" recommendations. To a degree, then, the modified educational program may not be entirely operative. Relying upon the evidence available, this researcher decided to accept the assumption that in June, 1960, there was a truly Modified Educational Program.

The extent of the effect of the modified educational program upon the base educational program now becomes a crucial question. This researcher carefully compared the two educational programs. This comparison resulted in isolating discernible differences. Some differences are specific, others general. These differences were recorded and indexed as far as possible according to headings of school plant, community relations, and program. The differences then were translated into point values of all the items in the evaluation instrument (see Appendix C). These point values varied according to the apparent emphasis desired by the Detroit Board of Education and the point values assigned by the instrument.

These translated point differences were reviewed by an elementary school-community planner of the Detroit Board of Education staff. This Detroit planner evaluated the point differences; and of the 114 items, he suggested one item be re-evaluated for a greater spread of two points over what this researcher had evaluated.

The Population

All of the subjects in the present investigation were public elementary schools of the Detroit, Michigan, Public School System, and in use in 1960. There are 228 school plants in the population. The plants were believed to be representative of all elementary plants in the Detroit School System. Typically the plants consist of grades K-6 or K-8. They are located in all areas of the city. They vary in pupil population from a few hundred up to a thousand plus. Some plants are located on small one acre sites while others are found on sites adjacent to spacious city parks. Some plants house pupils in portable, temporary buildings and churches in addition to a named building.

The Sample

There are two hundred twenty-eight school plants termed "elementary school plants" within the Detroit Public School System as of 1960. The school plants termed"new" were selected from the

population of school plants erected from 1945 to date, inclusive. This fifteen-year span was selected because of a relatively inactive building program in the 5 years between 1955 and 1960. Within this fifteen-year span there were 31 school plants erected. Three plants were eliminated because they contained grade classifications below K-6; fifteen plants were eliminated because they housed a grade or grades above the K-6 designation. The sample of five new plants was thus selected at random from the remaining thirteen school plants.

The "middle-aged" plants were selected from the school plants erected between the years 1920 to 1929 inclusive. This period was selected as representative of the nation-wide building program underway at the time and because of the emergence of the Detroit platoon system during this period. Seventy-three elementary plants were erected at that time. Six plants were eliminated from the population because they contained a grade or grades less than K-6; forty-five were eliminated because they contained a grade or grades above K-6. The five middle-aged plants for the present study were randomly selected from the remaining group of twenty-two plants.

The school plants termed "old" were selected from the elementary plants erected from 1874 to 1912, inclusive. The ending year of this span was set at 1912 because a Detroit city ordinance was promulgated in that year which limited construction of only fire resistive plants. Fifty-nine plants were erected during this period and constitute the total population of "old" plants for this study. Eight plants were eliminated from the sample because they contained grades less than K-6; thirteen plants were eliminated because they

contained a grade or grades above K-6. Thus thirty-eight plants remained from which five were randomly selected for the present study.

A total of fifteen school plants are included in the sample for this present study. These are listed in Appendix F.

The data on construction dates of elementary school plants was obtained from the Architectural Planning Department, Detroit Board of Education. The grade designations were obtained from the Directory, Detroit Public Schools, Detroit, Michigan, 1959-60.

The randomization procedures referred to in this section will be fully described in the following section.

The Stratified Randomization Procedures

Three distinct groups were selected as representative of the classifications of new, middle-aged, and old school plants. All the elementary school plants erected during these periods were listed from records of the Architectural Planning Department. These plants were checked from grade levels. Only K-6 plants were retained in each group. The name of each remaining school plant in each group was placed on a card. These cards were placed in serial order. The plants to be utilized for this study were then selected by the numbers supplied by a table of random numbers (70, p 238-9). No bias was introduced by this method as each plant in each group had an equal chance of being selected.

EVALUATION INSTRUMENTS

The modern experimenter in education can frequently use existing instruments for the purpose of the investigation, but often it is necessary to construct or adapt available instruments appropriate to the objectives being sought in the study. In the present study an existing instrument is utilized and modified. This section contains a description of the evaluation instrument utilized, a discussion of its adaptation to a base and a modified educational program, and a review of the collection and recording of the data.

The Instrument

The evaluation instrument utilized in the present study is the "Citizens Workbook for Evaluating School Buildings," by Jack L Landes and Merle R Sumption (see Appendix A).

This instrument makes the educational program a primary consideration. Contrary to traditional score cards where standards often do not relate to a function of a building, this instrument develops from a school program frame of reference. The approach, then, is a functional one. Beginning with the premise that a school building should house an educational program, the main consideration becomes the extent to which a building fulfills this purpose.

The instrument encompasses ten functions of a school plant for evaluation. They are:

1. Adequacy
2. Suitability
3. Safety
4. Healthfulness
5. Accessibility
6. Flexibility
7. Efficiency
8. Economy
9. Expansibility
10. Appearance

Within each function there are numerous items and questions which receive varying point values from one to fifteen. There are one hundred possible points within each function. With ten functions, then, a theoretically perfect plant would possess one thousand points.

Although developed for use in the elementary, junior high, and senior high schools, the instrument can be adapted for use on any specific level. The instrument was adapted for use in grades K-6 for the present study.

The instrument has been validated by use and experience. Often evaluation instruments attain numerical, statistical scores of reliability and validity. This is not true of building evaluation instruments. This researcher recognizes this deficiency yet has decided upon this instrument as representing one of the best for evaluating school programs operative within school plants. Other school plant specialists were consulted on the use and experience validation for the selection.

Collection and Recording of the Data

Prior to visiting any school plant, a folder was prepared for each plant in the sample. This folder contained invaluable information necessary for a complete evaluation. Each folder contained: a floor plan which noted major additions and improvements; a plant classroom report which noted pupil population by rooms, the existence of portable and temporary facilities, and platoon sections; maps of the attendance service area and relationships of the plant to the site; and a recording sheet for the scores by items allotted to the base and the modified educational programs. An additional note was added indicating the precise site size as recorded in the files of the Architectural Planning Department of the Detroit Board of Education.

In order to eliminate potential bias in scoring, this researcher decided to plan the visitations to follow this order; first, a new plant; second, a middle-aged plant; and third, an old school plant. This order was repeated until all fifteen plants were visited. An additional attempt was made to gain consistent estimates in evaluation insofar as possible by attempting to evaluate plants within each group in the order of downtown area, central city area, and outer edge. This latter order was almost impossible to adhere to completely. Yet it was deemed advisable to attempt this order to reduce as far as possible any obvious inconsistency of estimate because of the geographical location of a particular plant or group of plants.

Further preparation for the school visitations was made by a pre-test. A plant was selected from the plants not within the selected sample. It was a middle-aged plant. This pre-test served to establish more concretely a plan for evaluating the plants of this study.

The visitations for this study were then made. Each visitation lasted one day. Fifteen days were required to visit the total sample. During each visitation as many people as possible connected with each plant were involved. This group included administrators, teachers, custodians, and engineers.

Each evaluation began with a study of the school plant's folder. An automobile ride was taken through the attendance service area and around the school site. A careful study of the site and exterior of each plant was made next. This researcher then evaluated the interior of each plant beginning on the second floor. This researcher visited every room, closet, floor, and hallway. Notes were recorded during each phase of the visitation. After the interior was studied this researcher evaluated the base and the modified educational programs simultaneously while still in the plant. When needed, additional trips through the plant or area would be made to aid the evaluation of specific items of the evaluation instrument. The scores for each plant were recorded at that time upon a data collection form.

Summary

The design of the present study assigned school plants to three groups: new, middle-aged, and old. Each school plant within each of these groups was evaluated according to the impact of a base educational program and a modified educational program; the difference between the two programs was determined. Control of extraneous variables was obtained by the stratified randomization technique. The use of a single evaluator furthered consistent estimates. No provision for replication was provided as was no traditional control group as such. The "t" test was the main statistical tool utilized. The 5% level of significance was determined prior to the study. A system of ranking was employed.

The base educational program was described as that program operative in the Detroit Public Elementary Schools in 1957. The modified educational program was obtained from the activity of the Detroit Citizens Advisory Committee in 1958 and 1959. The population, sample, and randomization procedures were fully elaborated.

The "Citizens Workbook for Evaluating School Buildings," by Landes and Sumption was described. The adaptation of this instrument to the base and modified educational programs was noted, as was the procedure for collecting and recording the data.

The following chapter provides an analysis of the data secured during the evaluation period.

CHAPTER IV

ANALYSIS OF THE EXPERIMENTAL RESULTS

A description of the computational procedures, the results of the tests of assumptions underlying the statistical techniques, and the evaluation of the hypotheses resulting from the statistical tests for the total sample and separate groups of school plants will be discussed in the present chapter.

THE COMPUTATIONAL PROCEDURES

The basic data for each individual plant, including the individual item scores and the ten function scores for the base and modified educational programs were recorded on summary score sheets. The summary score sheets were sorted into the respective groups of new, middle-aged, and old plants. Within each group the plants were arranged in the order of their total scores under the base program; the highest score was labeled plant number one, the second highest score was labeled number two, etc., until each plant in each group was labeled. Thus, New-1 refers to the plant with the highest score within the group of new plants; New-2, the second-highest scoring new plant, etc.,. Within these groups each plant was examined for its difference between programs. The total sample and each group were examined for their difference of mean, sum of scores, and sum of squares of scores for the statistical treatments required.

The "signs" test utilized in this study required simple comparisons of the base and the modified educational program scores for each building. In this study the method utilized to gain the precise scores was simple subtraction on a calculator.

The ranking scores were determined by hand scoring each individual item of each plant and recording the score of the difference on a master ranking sheet. This master ranking sheet reflected the differences for each item.

Appendix D presents the statistical formulas and sample computations.

TESTS OF STATISTICAL ASSUMPTIONS AND EVALUATION OF HYPOTHESES

The results of the signs test of the differences between the base and modified educational programs are recorded on Table I, on the following page. Simple observation of the differences in the scores of the base and modified programs reflects a negative direction. This direction persists in all the plants. Here direction, however, does not constitute significance. Nonetheless the direction is noteworthy.

TABLE 1

RESULTS OF SIGNS TEST OF THE DIFFERENCE BETWEEN THE BASE AND MODIFIED EDUCATIONAL PROGRAMS

Plants	Base Program	Modified Program	Difference	Sign
New-1	858	809	49	negative
New-2	792	747	45	negative
New-3	789	713	76	negative
New-4	744	693	51	negative
New-5	703	637	66	negative
Totals	3,886	3,599	287	negative
Middle-age-1	719	660	59	negative
Middle-age-2	689	594	95	negative
Middle-age-3	669	566	103	negative
Middle-age-4	654	571	83	negative
Middle-age-5	645	600	45	negative
Totals	3,376	2,991	385	negative
Old-1	550	469	81	negative
Old-2	534	445	89	negative
Old-3	515	411	104	negative
Old-4	459	383	76	negative
Old-5	457	400	57	negative
Totals	2,515	2,108	407	negative
Grand Totals	9,777	8,698	1,079	negative

The results of tests of homogeneity of samples are presented in Tables 2 and 3. It will be noted that the F value for the total sample and individual groups places the estimates for the sample's means as part of the population.

TABLE 2

RESULTS OF THE F TEST FOR HOMOGENEITY OF THE TOTAL SAMPLE

Program	Sum of Squares	S^2	F^*	Hypothesis
Base Program	6,589,089	15,460.03	1.16	Accept
Modified Program	5,295,306	17,973.29		

*$F_{5\%\ (14,14)}$ 2.86

TABLE 3

RESULTS OF F TEST FOR HOMOGENEITY OF GROUP SAMPLES

Programs	Sum of Squares	S^2	F^*	Hypotheses
New Plants:				
Base Program	3,033,694	3,373.7	1.209	Accept
Modified Program	2,606,877	4,078.75		
Middle-age Plants:				
Base Program	2,282,984	877.2	1.60	Accept
Modified Program	1,794,833	1,404.2		
Old Plants:				
Base Program	1,272,411	1,841.5	1.5146	Accept
Modified Program	893,596	1,215.8		

*$F_{5\%(4,4)}$ 715

The F test involves only the ratio between two means; this ratio assists only in establishing confidence that the sample was representative of the population. We must now turn to the "t" test, which indicates differences between mean scores, to determine whether or not a difference exists which has any statistical significance. The results shown in Table 4 reveal that the differences between the means of program scores is probably significant at the 5%, and even at the 1%, level.

We are now ready to evaluate the hypotheses of this study:

Hypothesis 1

Statement: The educational adequacy of existing school plants is significantly different as a result of program modification.

To answer this hypothesis a base and a modified educational program were determined from the materials and personal interviews in the Detroit public elementary schools. The base and modified programs were determined simultaneously through the use of the Landes-Sumption rating scale. The rating scale is the instrument through which the educational adequacy rating for each program was determined. Through this scale, numerical scores were derived which allowed statistical analysis. Table 1, page 69, reflects the differences between programs for each building. By reviewing Table 1 it is readily observable that all the scores are larger for the base program than for the modified program. Table 1 then defines the direction of the difference; in this case, the educational

adequacy of the base program is greater than that of the modified program. In order to determine the significance of this difference, we turn to the use of the "t" test. Table 4, below, indicates the results of the "t" test as applied to the total sample and all sub-groups.

TABLE 4

RESULTS OF THE "t" TEST FOR DIFFERENCES BETWEEN MEAN SCORES OF BASE AND MODIFIED EDUCATIONAL PROGRAMS FOR TOTAL SAMPLE; NEW, MIDDLE-AGED, AND OLD SCHOOL PLANTS

Group	Stand. Error of Diff.	Critical Ratio	Degrees of Freed.	Levels of Significance 5%	Levels of Significance 1%	Conclusion
Total Sample	5.298	13.57	14	1.76	2.62	Significant
New Plants	5.85	9.81	4	2.13	3.75	Significant
Middle-age Plants	10.93	7.04	4	2.13	3.75	Significant
Old Plants	7.724	10.5	4	2.13	3.75	Significant

Review of Table 4 indicates that there is a significant difference between the base and modified programs for the total sample and each of the sub-groups. It will also be noted that the critical ratios are large enough so that even at the 1% level all groups can be considered significant.

Conclusion: Accept Hypothesis 1. In addition, it should be added that the educational adequacy, recorded through mean scores, is significantly higher for the base program than for the modified program.

Hypothesis 2

Statement: The difference in educational adequacy resulting from program modification is significantly greater for middle-aged school plants than for new school plants.

This hypothesis was tested with the same data as utilized in hypothesis 1 above. In testing this hypothesis, however, the emphasis in the "t" test was placed upon the differences recorded between the base and modified program for each plant in the new and middle-aged groups. These differences, then, are of the mean of the estimated differences between programs. Table 1, page 69, tells us that the total raw score difference within all middle-aged plants is 385, and within all new plants the score is 287. The estimate of the difference of the mean scores would be greater for middle-aged plants than new plants. We must, however, turn again to the use of the "t" test to examine the significance of these estimated differences. This examination is given in Table 5, below.

TABLE 5

RESULTS OF THE "t" TEST FOR DIFFERENCES BETWEEN MEAN SCORES OF BASE AND MODIFIED EDUCATIONAL PROGRAMS FOR NEW VERSUS MIDDLE-AGED PLANTS

Group	Stand. Error of Diff.	Critical Ratio	Degrees of Freed.	Levels of Significance 5%	Levels of Significance 1%	Conclusion
New Plants Middle-age Plants	12.37	1.58	8	1.86	2.90	Not Significant

The foregoing table tells us that the estimate of differences in educational adequacy mean scores is not significant between new and middle-age plants.

Conclusion: Reject Hypothesis 2.

Hypothesis 3

Statement: The difference in educational adequacy resulting from program modification is significantly greater for old school plants than for new school plants.

The testing of this hypothesis required the use of the base and modified educational programs and was evaluated by means of the Landes-Sumption scoring instrument. Again referring to Table 1, page 69, the raw score of the differences of the school plants termed old is 407 and for new plants the score is 287. It can, therefore, be concluded that the estimated differences when totaled among the old school plants is greater than among new plants. The extent of the difference is then put to the test for a discovery of significance by Table 6, below.

TABLE 6

RESULTS OF THE "t" TEST FOR DIFFERENCES BETWEEN MEAN SCORES OF BASE AND MODIFIED EDUCATIONAL PROGRAMS FOR NEW VERSUS OLD PLANTS

Group	Stand. Error of Diff.	Critical Ratio	Degrees of Freed.	Levels of Significance 5%	Levels of Significance 1%	Conclusion
New Plants Old Plants	9.67	2.48	8	1.86	2.90	Probably Significant

The results of Table 6 tell us that the difference between the mean scores of the base and modified programs for the new versus the old plants is probably significant.

Conclusion: Accept Hypothesis 3. In addition, it should be added that the difference among the old school plants is significantly greater than among the new school plants.

Hypothesis 4

Statement: Items and functions can be identified which are the major cause of the difference of educational adequacy of school plants resulting from program modifications.

Within the frame of reference of this hypothesis lies the core of evaluation of buildings. When specific items can be isolated as constituting the cause of a low-scoring school plant, direct action may be taken to improve or correct that score and ultimately the improvement of a plant may be gained. The most comprehensive and elaborate study of a school plant would indicate that many improvements are needed or desirable. This process might include lengthy lists of items peculiar to separate plants, which would be vital for correcting or improving an individual plant. This present study, however, concerns itself not with an imperative rating of any single plant, but the relativeness of groups of plants. From a relative perspective, then, the process must center itself

upon comparing those items which apply to all plants. Often these items which apply to all plants are generally stated, and of course others are specific. The degree of generality of an item does not detract from its relative importance when applied to a group of plants. With this brief background we can enter Table 7 which lists the 10 functions of the evaluation instrument in ranking order of differences between programs. Table 7 is presented below.

TABLE 7

RANKS OF TEN FUNCTIONS OF PUBLIC ELEMENTARY SCHOOLS IN ORDER OF DIFFERENCES BETWEEN BASE AND MODIFIED EDUCATIONAL PROGRAMS

Function	New Plants		Middle-age Plants		Old Plants		Total Plants	
	P.D.*	Ranks	P.D.*	Ranks	P.D.*	Ranks	P.D.*	Ranks
Suitability	65	1	77	1	66	2	208	1
Adequacy	43	3	63	2	59	3	165	2
Appearance	19	8	47	3	68	1	134	3
Flexibility	47	2	35	4	38	6	120	4
Efficiency	29	4	27	6	41	5	97	5
Healthfulness	23	5	24	8	44	4	91	6
Expansibility	20	7	31	5	21	8.5	72	7
Accessibility	22	6	26	7	21	8.5	69	8
Safety	9	10	23	9.5	29	7	61	9
Economy	12	9	23	9.5	20	10	55	10

* P.D. - Point Differences

When interpreting Table 7, the lower ranks (ie 1, 2, and 3) indicate a greater difference between the base and the modified programs than the higher ranks (ie 8, 9, and 10). Suitability of the school plants in this study reflected the greatest change in the educational adequacy of the plants. Conversely, the least change is found in the economy of operating the plants. The placement of suitability and adequacy in prominent positions of difference indicates increasing concern by the Detroit Board of Education to provide for these functions.

In addition to the ten functions listed in Table 7, the specific items under scrutiny within these functions have been ranked. A partial ranking of these specific items is found on the next page in Table 8. The item titles in Table 8 are abbreviations of questions or statements in the evaluation instrument. The complete ranking of these specific items may be found in Appendix E.

Table 8 should be interpreted as a ranking of items by the frequency of differences. Item number one, for instance, received fifty-one points difference between the base and modified educational programs. The total scores were utilized in determining the ranks for all the plants; the ranks of totals, therefore, are not an average of the ranks cited for the three sub-groups. Scores and ranks within each group of new, middle-age, and old plants provides additional insight into the relative rank each item holds in the difference between the programs.

Through an observation of Tables 7 and 8 it can be readily seen that functions and items have been listed and ranked.

Conclusion: Accept Hypothesis 4.

TABLE 8

RANKING OF TOP TEN ITEMS CAUSING A DIFFERENCE BETWEEN THE BASE AND MODIFIED EDUCATIONAL PROGRAMS; INCLUDING POINT DIFFERENCES BY ITEM FOR EACH GROUP OF SCHOOL PLANTS AND THE TOTAL SAMPLE

Item	New Plants		Middle-age Plants		Old Plants		Total Plants	
	P.D.*	Ranks	P.D.*	Ranks	P.D.*	Ranks	P.D.*	Ranks
Is there a classroom shortage?	9	7	22	1	20	1	51	1
Does building layout facilitate pupil movement?	9	7	8	8	12	3	29	2
Are classrooms large enough?	10	3.5	9	4.5	9	7	28	3
Are service facilities large enough in case of expansion?	11	1.5	8	8	8	11.5	27	4.5
Are toilet facilities adequate?	10	3.5	7	12.5	10	4	27	4.5
Are walls nonload bearing?	11	1.5	5	27	9	7	25	6.5
Are pupil rooms cheerful?	1	60.5	10	2.5	14	2	25	6.5
Are playgrounds easily accessible?	9	7	8	8	7	16.5	24	8
Are class services readily accessible?	7	12	9	27	7	16.5	23	9.5
Is site attractive?	4	35.5	10	2.5	9	7	23	9.5

*P.D. - Point Differences

The following and concluding chapter states the conclusions, implications, and subjective highlights of this study.

CHAPTER V

SUMMARY, CONCLUSIONS, IMPLICATIONS, AND SUBJECTIVE HIGHLIGHTS

The present study concerns itself with the impact of program modification upon school plants. This current chapter will summarize the problem, the review of literature, methodology, and evaluations of hypotheses; state tenable conclusions; and set forth implications which evolve from the conclusions of the research.

SUMMARY

Schoolhousing needs are receiving increasing attention on the local, state, and national level. This increasing concern is the outgrowth of the population explosion, rising costs, and improved methods of instruction. It is commonly agreed that the methods of instruction and the educational program should receive mounting importance in the creation of school plants. This increasing concern for improving the educational program was accepted by the Detroit, Michigan, Citizens Advisory Committee. This citizens group recommended certain specific modifications, that, when taken collectively, may be considered a major program modification. This study is a direct outgrowth of this citizens group activity; it is an attempt to evaluate the impact these program modifications may have upon the existing school plants in the City of Detroit School System.

In conducting this study, the educational adequacy of school plants was selected as the most feasible concept for evaluating

program modifications. A rationale was developed describing educational adequacy as the measure of releasing or thwarting the potential of an educational program. Definitions, delimitations, and hypotheses were spelled out in establishing a frame of reference within which this study was conducted.

A review of pertinent literature for this study was deemed necessary to assemble materials and research on the evaluations of school plants, curriculum, and change in education. In the study of school plants it was noted that these evaluations date back to the erection of the first school plant. These initial, crude, subjective evaluations have been steadily replaced by more objective, concise methods. Today, numerous score cards are available to citizens, educators, and organizations for more precise evaluations. Teams of specialists are often called upon to evaluate the school plants in an entire school district. All evaluators find assistance in the accumulated research, the assimilation of more refined guiding principles, and more specific criteria and standards.

The review of literature for curriculum concentrated upon the educational program in Detroit, Michigan. In this review the Detroit Platoon System, or simply the Detroit Plan, was described, indicating a horizontal organizational plan. Under this arrangement pupils would remain in a homeroom for half a day and the remainder of the day pupils would move between specialized rooms such as a gymnasium, an auditorium, and a science room. The efforts of the Detroit Citizens Advisory Committee to improve the program were briefly summarized, and areas of the program recommended and

approved by the Board of Education were categorized.

Research studies on the concept of change in education were reviewed. Even though these studies may be questioned on their validity and accuracy, certain tendencies were noted. Under the term of "adaptability", Drs. Mort and Cornell of Columbia University have pioneered the development of measuring change. The initial study conducted by these two leaders has lead to further research attempting to grapple with this illusive phenomenon. Studies which concerned changes and their effect upon community, tax leeway, group living, public opinion, and elementary school principalships were cited.

The design and methodology of this study were described in Chapter III. Three groups of elementary school plants were selected in Detroit, Michigan. The first group was labeled "new" plants for those plants erected between 1945 and 1960; the second group of "middle-age" plants represented plants erected between 1920 and 1929; the third group of "old" plants represented those plants erected prior to 1912. A base educational program was described as that program operative in Detroit roughly in 1957. A modified educational program was described as the program operative after the Citizens Advisory Committee recommendations were approved by the Board of Education. The base and modified programs were superimposed upon the Landes-Sumption Workbook for evaluating school plants. The variables, plan of the design, control of extraneous variables, statistical treatment, population, sample, randomization, and the instrument were discussed and developed. The differences reported between the base and modified programs

were analyzed in Chapter IV.

The analysis of the experimental results began with an explanation of the computational procedures. The "t" test which was used as the statistical device, was included within this discussion. A signs test was also utilized which focused attention upon the observation that all differences between programs were negative, or that all plants had a lower educational adequacy rating as a result of these program modifications. An F test was given to determine the advisability of assuming that the samples were from the parent-population. This test indicates that the total sample and all sub-samples were probably taken from the parent-population. The "t" test was then administered to the total sample and each sub-sample. In each case the difference between the base and modified programs was significant at the 1% level. This test indicates that the measurable differences could have resulted from chance in no less than once in a hundred applications. The "t" test was then applied to the observed mean differences between the program scores in the new plants; these differences were compared with those of the middle age plants. Statistically this difference may be due to chance. A similar comparison between the differences among new and old plants indicates that the older plants are probably significantly lower in ratings than the new ones. The major causes of these differences were ranked by the functions and the individual items of the data-gathering instrument.

The following section contains the conclusions which are drawn from the preceeding research.

CONCLUSIONS

As a result of this study on the impact of program modifications for the elementary schools in Detroit, Michigan, the following conclusions seem warranted:

1. Where major program modifications occur, the educational adequacy of existing school plants decreased significantly.
2. Where major program modifications occur, the educational adequacy of old school plants tend to be reduced significantly more than new school plants.
3. Where major program modifications occur, the educational adequacy of middle-age school plants tends to be reduced slightly more but not significantly more than new school plants.
4. Certain items may be singled out as contributing most to the reduction in educational adequacy as a result of program modifications, namely, and in this order:
   a. There is in several plants a classroom shortage.
   b. Some school plant layouts hamper easy movement from place to place.
   c. Most academic classrooms tend to be too small.
   d. Gymnasium, cafeteria and similar general service facilities tend to be too small in the event of expansion.
   e. Toilet facilities seem inadequate and unsanitary in some schools.
   f. Walls between adjacent rooms are too often load-bear-

ing and not easily moved.

g. Some rooms in which pupils work are not as cheerful and attractive as they should be.

h. Playgrounds, outdoor areas, and recreational areas are not, in all plants, readily accessible to pupils who use them.

i. General service provisions are not always readily accessible.

j. Some sites are not attractively planned and landscaped.

IMPLICATIONS

The implications emerging from this research extend themselves into countless areas of education, school plant planning, and curriculum. Some of the more obvious and striking implications are cited:

1. This study raises certain questions about the impact of program modification on school buildings which should be explored on a broader scale. Enough doubt exists in the mind of this researcher to seriously question modernization of the older school plants in light of the loss of certain educational values.

2. Continued study and investigation should be directed toward evaluating more precisely the effect a citizens committee may have on program modifications, the quality of its recommendations, the methodology of determining

recommendations, and the extent of adoption of recommendations.

3. Much more effort could profitably be expended toward interpreting a school program through a school plant.
4. A stronger emphasis could be directed toward considering the educational program to be housed in a given plant today with provisions for changes in the future.
5. A study similar to this research should be applied to school districts where major program modifications are made on the secondary level.

SUBJECTIVE HIGHLIGHTS

There has been a long standing contention that school plants effect school programs. This contention is frequently held by the teachers in the classroom, administrators, and school-plant planners. For these groups, and many others, this study has attempted to shed light on the extent, if any, a school plant effects the school program. According to all available resources, this study is the first comprehensive attempt to answer this question.

A crucial question in a study of school plants centers upon the evaluative techniques and instruments. Any objective instrument applied to a group of school plants enhances yet restricts the best comparisons. Common standards on a great number of items enhances consistent estimates. Specific items, conversely, restrict the researcher from elaborate rewarding or deprecating any exceptionally prominent features. Perhaps the relative educational adequacy of the plants in this study would have varied if the researcher had made

unrestricting subjective evaluations. The study utilized the objective form as the preferred method over the subjective type.

In the future, however, certain improvements can possibly be made in the evaluative instrument, namely:

1. An attempt should be made to prepare a series of evaluative instruments based on varying educational philosophies.
2. The instruments should be prepared for more inclusive and extensive objective consideration of school plants.
3. The ten categories of the Landes-Sumption Form could be utilized as a model for providing guide lines of the point values per item evaluated.
4. An additional category for "Exceptional Features" could be inserted along with the ten categories of the Landes-Sumption Form. This category could add to or detract from the total rating for school plants.
5. An attempt should be made to statistically validate the instrument.
6. An attempt should be made to determine the statistical reliability of the instrument.

Before discussing the conclusions more fully, this researcher desires to point up a frame of reference surrounding program differences. It is understood that all physical plants have educational limitations. Inspite of the best intentions of planners, circumstances often dictate compromise. These compromises occasionally effect a plant's educational adequacy. The main quest

of this study was to attempt a measurement of the effect a school plant had upon thwarting or assisting program modification. Consequently the educational adequacy rating *per se* became a secondary concern to the difference between the programs. In a secondary role, the precise educational adequacy rating, even of the unsatisfactory plants, received no prominent emphasis. One could argue the senselessness of declaring a plant unsatisfactory under a base program and even more unsatisfactory under a modified program. Someone else might argue the other position, namely, perhaps a lower score than unsatisfactory with a modified program would encourage more immediate attention to correct deficiencies. Nonetheless, this study retains emphasis on the differences, not the ratings *per se*. With this subjective background, let us ramify the conclusions of this study.

The first, and most basic, conclusion to this study declared that the educational adequacy of a school plant is significantly different as a result of program change. This conclusion may be construed to support the contention that a school plant is erected for a particular program. It may be, further, believed that school plants in general have built-in features which hinder adaptability to a new, or revised school program. Unless greater emphasis is placed upon flexibility and adaptability, it may be argued that the erection of a school plant today automatically commits a school district to perpetuate today's program for fifty years, or longer, into the future. Inflexibility of programs may entrench educational conservatism.

In Detroit, this conclusion may be interpreted to mean that

the existing school plants have had noticeable difficulty adjusting to a modified program. In all probability the existing school plants will not be able to adjust to the modified program as completely as desired. Certainly, some adjustments can be made for selected portions of the program. It remains, however, that unless certain steps are taken to eliminate or correct deficiencies, the educational adequacy of the elementary schools in Detroit will be significantly lower as a result of the program change.

The implication for other schools outside Detroit may be more striking. If a school district, for example, is planning a program change which would incorporate the team teaching, ungraded, etc., programs, definite provision should be included toward modernizing the existing plants to house the altered program. Unless modernization steps are taken, the altered program will be seriously hampered and its possibility of success somewhat limited.

The second and third conclusions extend and ramify the first conclusion. Where the first conclusion examined the question of the extent of difference of all school plants in adjusting to a modified program, the second and third conclusions compared the program impact upon the new school plants with the middle-aged plants and with the old school plants.

The second conclusion declares that although all school plants are significantly different as a result of program change, middle-aged plants were not significantly any worse off than new plants. It is true that the middle-aged plants did not adjust as well as the new plants, but the comparisons were not large

enough to be considered significant. This is not difficult to believe for Detroit elementary schools inasmuch as the plants in both groups contained many similar features and were erected from quite similar plans.

A more careful examination of the data utilized to arrive at this second conclusion raises certain questions about the future of the comparison of differences between the new and middle-age plants. The total differences between the programs in the new plants, for instance, is recorded as a score of 287; the recorded total differences between programs in the middle-age plants is 385. Statistically, this difference is not significant as indicated in Table 5, page 73. Yet, the difference between the programs in the old plants was recorded as 407, and this score was evaluated as sifnificant when compared with the score of 287 with the new plants. If, then, the differences for the middle-age plants would have increased merely 22 points and also become scored at 407, they would have been significantly different from the new plants. In other words an increase of about 20% in the differences would bring about this change. This meager score of 22 points difference perhaps indicate that in a very few years these plants may differ significantly from new plants. Certainly, in 10 to 20 years, all the plants in the middle-age group (as defined in this study) would become old plants (40 years old or older) and quite conceivably, then, the difference between programs would be significantly different from the new plants. We do not know enough about these differences between the middle-age and old school plants; much more study and research may be desirable to

assist in long term planning to provide school plant needs.

The third conclusion states that a significant difference was found between the impact of the programs of the new plant and the old plants. In other words, the old school plants adjusted significantly less well to the modified program than did the new plants. As a result of this conclusion, modernization expenditures should receive prime consideration if it is expected that the old structures will remain in operation and they will be required to house the modified program.

This third conclusion is meaningless in the school district where initial capitol outlay looms as the greatest criteria for education. This conclusion would be bothersome, however, in districts where the educational program is the primary concern. This conclusion does not rule out the possibility of modernization; for it is conceivable that funds could be expended on the old plants to up-grade them. I would rather seriously question the educational returns per dollar expended in such a move. This researcher questions, for example, the amount of flexibility that can be modernized into a plant where there are load bearing walls, ultra wide corridors, hazardous stairways, etc.; or the amount of healthfulness available in basement classrooms and sites smaller than 3 acres. This researcher becomes even more leery of modernizing old plants when some of the more conceivable curriculum modificiations of the future are contemplated. What plant modifications would be required to adapt to team teaching? The ungraded school? Classroom television instruction? Large class(100-200 pupils) instruction? Do plant planners have an obligation to provide for

the foreseeable future to say nothing of the 1990's? Can a plant planner conscientuously recommend modernization of these old plants periodically with every major program modification?

The final conclusion of this study identifies the key factors which caused the difference between the base and modified programs in Detroit. The bare conclusion deserves elaboration. The conclusion, as written in ranking order, was taken from the specific items contained in the data gathering instrument. These items hide or belittle many exacting details which produced the final score. Each key factor ranked in Table 8, page 78, is repeated below with causes of the differences between program scores.

1. In most plants there is a classroom shortage.

   More classrooms are needed to move from the Detroit Plan to the self contained plan. Under the Detroit Plan almost every available room was utilized during the entire day including the gymnasium, auditorium, and often the library and audio-visual aids room, where available. One school was found utilizing a church basement for classrooms. Another school utilized a converted gymnasium storeroom in the basement for a classroom. With these efficient uses of classroom space housing 32-35 pupils, the program modification reducing the ratio to 30 pupils per teacher would necessitate additional classrooms. In some cases the desired total pupil population of 600-800 requires additional classrooms. Additional classrooms would also be needed to house the self contained groups which would inefficiently leave

a classroom unoccupied while the pupils were in the gymnasium or library for short periods. Most of Detroit's schools are over-crowded; only one plant was discovered in this study which could handle the expansion into a greater number of classrooms.

2. The layout in some school plants hampers easy movement from place to place.

This condition arises most frequently where additions are made to a building, or portable classrooms are unattached to the basic structure. Conditions were also found where primary classrooms could not be grouped because of intervening special rooms as science, art, gymnasium. "Gang" lavatories were found hindering pupil movements. Some gymnasiums and libraries were not centrally located.

3. Most academic classrooms tend to be too small.

Classrooms in middle-aged and new school plants predominately measure 22 feet by 30 feet, or 660 square feet. This measurement is rated too small by the standard of 800 square feet in the data gathering instrument. Classrooms in old school plants measured between 700-800 square feet thereby more closely meeting this standard. The basic size becomes more critical when applied to an increased number of self-contained rooms.

4. Many gymnasiums, cafeterias, and similar general service facilities tend to be too small in case of expansion.

These facilities are generally utilized above

capacity under the present program. Some gymnasiums and cafeterias would be put to even greater use with a few extended services which are desired. This is particularly true where they are located in basements.

5. Many toilet facilities seem inadequate and unsanitary.

The difference in program for these questions centers upon "inadequate" not "unsanitary" toilet facilities. "Cang" toilets partially answer the need in the present program. Greatly increased numbers of individual room facilities would be desired in the self-contained organization. This room facility is nearly impossible in some older plants.

6. Many walls between adjacent rooms are load-bearing and not easily moved.

This question applies largely to older plants. Most all plants, however, had some walls where movement was restricted by plenum chambers or windows.

7. Many classrooms were found which could not be called cheerful and attractive.

Although Detroit attempts to fulfill the intent of this question, there is only so much which can be reasonably accomplished under certain conditions. Basement rooms, for example, can be only partially cheerful. Some rooms, because of location and arrangement, were noticeably depressing. Dark woodwork, black chalkboards, dark cabinets and doors, dull chairs and tables, and unsightly heat registers and drafts, con-

tribute to an unattractive atmosphere. Increased emphasis on mental health and atmosphere caused part of this difference.

8. Most playgrounds, outdoor areas, and recreational areas are not readily accessible to pupils who use them.

   Generally, Kindergarten and Primary rooms were not located near exits for most convenient movement to playgrounds. More than once a condition was found where only one door opened upon, or was immediately accessible to the playground. One plant had no back door, which forced pupils to use the front door and pass around the building to reach the play areas. This question becomes more critical with a more intensified program and an increased emphasis on mental health.

9. Most service and general service provisions are not readily accessible.

   The facilities in this question lean upon electric outlets, toilets, and drinking fountains. Most middle-age and old plants have one or two outlets for audio-visual machines; the placement of the outlets commonly necessitates the use of long cords. Toilets and drinking fountains are commonly grouped and bottlenecks in pupil movement exists.

10. Many sites are not attractively planned and landscaped.

    Most sites in Detroit are inadequate in size. Meager lawns are common. One plant was attractively

landscaped on one side while on another side bushes grew around a broken fence; still another side found the school plant touching the sidewalk. Extremely short distances between sidewalks and buildings were found in many middle-age and old structures.

In final conclusion, this section of the study has qualified and ramified a few portions of the main study. This section has provided a look beyond the basic data and conclusions. It is hoped this added insight may clarify many questions and thus promote further experimentation toward discovering more completely, the impact of program change on school plants.

APPENDIX A

Evaluation Instrument

Jack L. Landes and Merle R. Sumption, "Citizens' Workbook for Evaluating School Buildings". New York: Harper & Brothers, 1957.

I Adequacy of the School Plant

This term refers to the relationship between the size and the overall housing space on the one hand, and the number of students to be served on the other. Also listed under this aspect of functionality are internal features of the building that are more feasibly judged on a sufficiency basis than on a fitness basis.

Site

1. Is the site large enough for the number of pupils who will attend the school? (20)
   Suggested Standards for Site:
   The school site should have sufficient space to permit the development of adequate outdoor physical education work, nature study, recreation, parking, and lawn areas. For the various administrative pupil groupings, minimum site requirements are as follows:

   Elementary---5 acres plus 1 additional acre for each 100 pupils.

2. Are all walks leading to the building sufficiently wide? (2)
   Suggested Standard:
   Walks should be wide enough for at least three people to walk abreast, a minimum of 66 inches, with additional unit widths of 22 inches as indicated by traffic.

3. Does the site provide adequate parking facilities for teachers, custodians, and visitors? (3)
   Suggested Provisions:
   a. A sufficient number to care for each staff member who regularly uses the lot.
   b. A sufficient number to care for citizens who daily make use of the lot.
   c. A sufficient number to care for patrons at public performances.

4. Are adequate play areas provided? (5)
   Suggested Provisions:
   Play areas should be large enough that all pupils can play at the same time.

Pupil Rooms

5. Are Academic classrooms large enough? (10)
   Suggested standards:
   35 square feet per pupil with a minimum of 900 square feet.

6. Are academic classrooms adequately equipped for carrying out the department's objectives? (5)
   Suggested Standard:
   There should be enough globes, maps, tables, desks, etc., to permit carrying out the department's objectives with the number of pupils enrolled.

7. Are laboratories and special rooms for arts, music, etc., large enough? (10)
   Suggested Standard:
   Special rooms should be ample in size to permit carrying out the activities indicated by the department's objectives.

8. Are special rooms and laboratories adequately equipped for carrying out the department's objectives? (5)
   Suggested Standard:
   A sufficient number of machines, stoves, electric outlets, etc., should be provided for carrying out the department's objectives with the number of pupils enrolled.

9. Are there enough classrooms and special rooms to properly house present and predicted enrollments? (15)
   Suggested Standard:
   Room need is determined by the number of weekly meetings and length of classes, amount of special use, the number of pupils enrolled, and teacher loads. It may be roughly determined by dividing the enrollment by the number of pupils to be placed in each class and adding an additional number to allow for the fact that rooms are not used every hour of the day. Although this number varies considerably according to the organization and size of the school, the approximate need is for an additional 1/10 for elementary schools.

10. Is there sufficient bulletin board space? (2)
    Suggested Standard:
    There should be enough bulletin board space to permit posting of notices and hanging of exhibits and examples of pupils' work.
    a. 12-20 lineal feet per academic classroom
    b. 6-8 lineal feet per special room.

11. Is there sufficient chalkboard space for essential pupil and teacher work? (2)
    Suggested Standard:
    a. 16-20 lineal feet for academic rooms
    b. 6-8 lineal feet for laboratories

12. Are built-in closets and cases adequate in both classrooms and special rooms? (3)
    Suggested Standard:
    There should be enough storage space to care for equipment and supplies which are regularly used.

General Features

13. Are provisions of space and equipment made for staff administrative purposes sufficient? (5)
    Suggested Work and Storage Areas:
    a. For principals' conferences with laymen, staff members, parents, and pupils.
    b. For clerical work.
    c. For storage of records, equipment and supplies
    d. For teachers' conferences and preparation of printed materials.

14. Are custodial space, equipment, and supplies adequate? (5)
    Suggested Standard:
    a. Equipment and supplies such as brushes and mops, pails and baskets, dust pans, chamois, sponges, scrubbing and cleaning machines, furnace, lawn and general repair tools, soaps, detergents, scouring powders, paint, varnish, waxes, oils, polish, paper towels and tissue, and hoists and elevators should be provided where needed.
    b. Workshop area where routine repair and maintenance work may be done.
    c. Storage areas where tools and supplies may be kept.
    d. Office area where reports may be made and files kept.
    e. Locker and washroom facilities.

15. Is adequate provision made for installation and removal of large pieces of equipment? (2)

Suggested Standard:

Service doors should be provided so that all large pieces of equipment in pupil rooms and general rooms may be installed or removed without removing doors or parts of the structural wall.

16. Do chimneys develop adequate draft for the heating system? (3)

Suggested Standard:

An adequate chimney will give a draft which provides sufficient air to permit the complete combustion of fuels.

17. Are building foundations adequately protected against vermin and moisture? (3)

Suggested Standard:

Foundations should resist the seepage of moisture, and should be free from cracks or openings which would permit the entrance of rodents and termites or other insects.

Total Adequacy Rating _____

II Suitability of the School Plant

This characteristic includes those features, such as type of plant and the facilities available, which enable the school to satisfactorily house the particular educational program to be carried on. Of necessity, this aspect requires an analysis of the equipment available.

Site

1. Are the playground, game, and practice area surfaces in condition for use soon after rain? (2)

Suggested Standard:

Play areas should have a slight surface drainage and should be free from depressions which retain water after rain. The subsoil should be of such a nature as to drain readily and be usable soon after rain.

2. Is the soil of the lawn, landscape, gardening, and agriculture areas of such nature as to grow plants readily? (2)

   Suggested Standard:

   Plant growing areas should have a good loam soil free from rocks and debris and have the proper acidity or alkalinity for growth of plants.

3. Are outdoor work and play areas suitably developed and equipped? (3)

   Suggested Standards:

   Outdoor work area should be developed for the activities suitable to children of the age using them.

   a. Elementary children's work area should have provisions for animal pens, construction of objects and models, gardening and soil conservation, etc. Play areas should provide game areas; apparatus such as climbing structures, horizontal ladders and bars, slides, see-saws; a paved area with various game courts marked off; and protected bicycle storage facilities.

4. Is the subsoil suitable for supporting buildings? (2)

   Suggested Standard:

   Subsoil should be of a type which retains an adequate bearing power for the load it is to carry, regardless of the varying moisture content for the locality.

5. Do walks and parking areas remain free from puddles after rain? (2)

   Suggested Standard:

   Walks should be slightly above the surface of the surrounding terrain and should have a slight slope in order to drain well. Parking lots should slope toward storm sewers which are adequate to carry the rainfall from the paved area.

Pupil Rooms

6. Are classrooms such that activity groups may work in an area separated from other groups? (3)

   Suggested Criteria:

   Various types of work alcoves may be built in or formed by separating counters, or by shelves about 3 feet high.

7. Are areas and facilities provided for all of the activities which should take place in the rooms? (5)
   Suggested Provisions:
   Space and movable equipment should be available for group study and discussions, individual and small group library and project work, art work, science work, etc.

8. Can seats and desks be easily moved and stacked? (3)
   Suggested Standard:
   Seats and desks should be easily movable into different seating arrangements when small group activities, visual education activities, open group activities, or large muscle activities are being conducted in the room. Seats and desks of a rigid, but adjustable, type which can be stacked permit the freeing of larger areas of the room.

9. Are provisions made for water use and waste disposal for classroom activities? (2)
   Suggested Provisions:
   Sinks and hot and cold water should be provided in activity rooms where teachers indicate need.

10. Are materials and equipment suitably stored or arranged and readily available for use? (1)
    Suggested Storage Facilities:
    a. Chalk, pencils, paint, etc., should be stored in fairly shallow drawers.
    b. Globes, larger specimens, and models may be stored in glazed cabinets with adjustable shelving.
    c. Corrosive and inflammable substances such as paint, gasoline, acids, phosphorus, etc., should be stored in special containers.

11. Are suitable audio-visual educational facilities and materials provided? (5)
    Suggested Standard:
    Darkening devices, viewing screens, electric outlets, and cables should be provided in all rooms where films or still pictures are to be projected. Space for storage of models, maps, and graphic materials should be provided in classrooms as well as in a central location. Phonographs, radios, and recorders, as well as still, moving picture, and opaque projectors should be available for use in music, speech, social science, dramatics, and other classes.

12. Are dust troughs provided at chalkboards? (2)

Suggested Standards:

Dust troughs of a type which keeps erasers out of the dust should be located immediately below chalkboards.

Suggested heights of dust rails of pupil chalkboards are:

a. Kindergarten, 1 foot and 10 inches.
b. Succeeding grades, an additional 1-1/2 inches per grade to a height of 36 inches for senior high grades.

13. Are chalkboards and bulletin boards, cabinets, tables, etc., of suitable height and type? (3)

Suggested Standard:

All fixtures should be adapted to the size of the pupils using them. Recent research indicates that chalkboards should be gray-green, with a reflectance factor of 15-20%, and located at the front of the room. Bulletin boards should be predominately at eye level heights, mounted at the sides and rear of the room, with one area adjacent to the room door.

14. Are provisions for science suitable? (5)

Suggested General Provisions:

a. For carrying on plant growing experiments.
b. For observing and studying insect colonies; aquatic animals, insects, and plants; land animals.
c. For teacher demonstrations of experiments.
d. For individual pupils' work on experiments.
e. For experiments in light and photography.
f. For storing and studying charts and specimens of rocks, insects, and seeds.
g. For construction of simple pieces of equipment and models.

15. Are provisions for shop work suitable? (5)

Suggested General Provisions for Industrial Arts:

a. For working and firing clay.
b. For leather, plastic, metal, and woodwork.
c. For planning, drawing and printing, and graphic arts.

16. Are provisions for homemaking suitable? (5)
    Suggested General Provisions:
    a. For study and practice in planning meals, selecting, preparing, storing, serving food, and managing a kitchen.
    b. For study and practice in selection of materials, and planning, construction, and care of clothing.

17. Are provisions for art suitable? (5)
    Suggested General Provisions:
    a. For study of and work with clay, plastics, wood, metal, reed, paper, cloth and other materials.
    b. For study and work with processes such as oil, crayon, charcoal, silk-screen, air brush, block printing, etc.

18. Are provisions for music suitable? (5)
    Suggested General Provisions:
    a. For music, instrument, and equipment storage.
    b. For comfortably seating the largest groups using the room so that all will have an unobstructed and direct view of the instructor.
    c. For practice by small ensembles, with little or no confusion or conflict with the other classes or school.

19. Are provisions for business education suitable? (5)
    Suggested General Provision:
    a. For study and practice in typing.

20. Are provisions for library work suitable? (5)
    Suggested General Provisions:
    a. For storage, repair, accounting, and use of books, magazines, materials, films, recordings, transcriptions, and audio-visual devices by individuals and small groups.
    b. For exhibition of local manufactory, art, and historical articles and processes.

21. Are provisions for health and physical education suitable? (5)
    Suggested General Provisions:
    a. For large and small group participation in various recreational activities.
    b. For health study, guidance, and correction.
    c. For shower, drying, storage, and laundry facilities.
    d. For nurses' and doctors' examinations, consultations, or treatments.
    e. For isolation and rest for pupils who are ill, injured, or convalescent.

22. Are provisions for assembly and public performance purposes suitable? (2)

Suggested General Provisions:

a. For presentation of film, speech, music, dramatic, and achievement programs.
b. For participation in forums, debates, and community programs.

23. Are provisions for hot lunches suitable? (3)

Suggested General Provisions:

a. For pupils and staff members to enjoy adequate, economical, well-balanced meals and practice courtesy and etiquette.
b. For school and community dinners.

24. Are suitable wardrobes or lockers provided? (2)

Suggested Standards:

Pupil lockers or wardrobes should accommodate all outdoor garments, books, and supplies usally stored therin. Shelves should be provided for book and supply storage. Hooks for garment hanging should be placed at convenient heights. All wardrobes and lockers should be well ventilated, and the air passing through them should be exhausted rather than drawn into the room or recirculated.

25. Are wardrobes or lockers located where they may readily receive supervision from the room teacher? (2)

Suggested Standard:

Lockers for elementary pupils should be located in the room or in the corridor immediately adjacent to the room.

26. Are special provisions made in wardrobes for damp clothing such as raincoats, overshoes, and umbrellas? (2)

Suggested Standard:

Ample space should be provided in lockers or wardrobes to permit a free flow of air around damp clothing.

27. Are facilities provided for community use? (3)

Suggested Provisions:

a. A room, which is adapted for meetings of the P.T.A. and other organizations, should be equipped with tables and chairs, facilities for use of audio-visual devices, chalk and bulletin boards, and conveniently located with respect to outside entrance, toilet, and kitchen facilities.

b. Other rooms, especially the gymnasium, auditorium and library, should also be available for community use when regular class schedules permit.

General Features

28. Are floors, walls, and ceilings finished with suitable materials? (5)
   Suggested Provisions:
   a. Smooth or acoustic ceilings.
   b. Smooth or acoustic upper walls.
   c. Scuff resistant wainscoting.
   d. Floors in shops, laboratories and other special rooms adapted as indicated to chemical, shock, heat, and water resistance.
   e. Floors in primary rooms warm, resilient, and a type easily maintained to minimize soiling pupil's clothes.

29. Is the size of building and fixtures suited to the size of the persons using it? (5)
   Suggested Provisions:
   a. Elementary, 1-story buildings, classroom ceiling height of 10-12 feet; toilet fixtures of intermediate size; playroom instead of gymnasium, etc.

30. Are window shades of a suitable type? (1)
   Suggested Standards:
   Roller shades should be double hung, preferably at the middle of the window. Venetian type blinds are also satisfactory. Blinds should be of a light color, and roller shades preferably will be of translucent vat-dyed duck.

Total Suitability Rating _____

III Safety of the School Plant

Safety is a function of those features of the school plant which make the building structurally sound and protect the students from hazards of traffic, fire and accidents.

Site

1. Are approaches to the school comparatively free from traffic hazards? (5)
   Suggested Standard:
   Underpasses or overpasses should be provided where pupils have to cross railroad tracks or main traveled highways in order to reach their school.

2. Is the site outside of the approach patterns of any airport? (2)
   Suggested Standard:
   School sites near airports should be located so that aircraft which are landing or taking off will not pass over the school grounds.

3. Is the site removed from industrial hazards? (5)
   Suggested Standard:
   There should be no corrosive or explosive manufactories or warehouses, gas storage tanks, electric generator plants, or similar hazards in the general vicinity of the school site.

4. Are there safety fences where necessary? (5)
   Suggested Standard:
   Safety fences should be provided to protect pupils from hazards of traffic, water, cliffs, etc., and to protect adjacent properties from trespass by pupils.

5. Is the playing surface comparatively free from hazards? (5)
   Suggested Standards:
   a. Playing surfaces should be level and free from cinders, large rocks, stakes, etc.
   b. Although turf is preferable, a stabilized soil makes a very good surface.
   c. Paved areas are best if composed of a resilient material, although concrete may be used for some surfaces.

6. Are play areas sufficiently separated? (5)
   Suggested Standards:
   Areas devoted to different age groups of pupils, and to different sports which are carried on at the same time, should have their boundaries sufficiently separated so that pupils chasing balls, or otherwise exceeding boundary lines, will not collide.

7. Is playground equipment safe? (5)
   Suggested Standard:
   Playground equipment should be sturdy, free from sharp projections, and regularly inspected and maintained to insure safety.

8. Is the site free from hazards of crosswalks and drives? (5)
   Suggested Standards:
   a. All drives and main walks should enter from the front or side of the building and should not be routed in such a manner as to cross play areas or pupil traffic lines between the building and play areas.

b. Drives should have turning circles or areas which are separated or protected from areas used by pupils.
c. Driveways should not circle buildings.

9. Is the view of oncoming traffic at corners and intersections unobstructed? (5)
   Suggested Criteria:
   Low plantings and walls should be used where school traffic merges with main traffic lanes.

Pupil Rooms

10. Are pupils protected against hazards arising from service systems? (5)
   Suggested Standards:
   a. All exposed steam pipes should be well insulated.
   b. Electric outlets should be firmly secured and suitably grounded or polarized.
   c. All permanent or semipermanent electric wiring should be enclosed in steel pipe conduit.
   d. All lights in moisture-laden rooms should be enclosed in vapor and moisture-proof cases and controlled by switches located outside of the room.

11. Are room exists safe? (5)
   Suggested Standards:
   a. There should be two well-separated exit doors from each pupil room which is not highly fire resistive.
   b. Single-room exit doors permit better teacher control of pupil traffic and are desirable in fire-resistive buildings.
   c. Exit doors from pupil rooms should open out into door wells.

12. Are facilities provided for fire control? (5)
   Suggested Standards:
   a. Furnace and fuel rooms should be fire resistive with self-closing fire doors.
   b. Fire blankets, sprinkler systems, sand, fire hose, and appropriate type or types of portable fire extinguishers should be provided within 75 feet of any portion of the building and in every shop, laboratory, and service room as especially indicated.
   c. Manual or low-voltage fire gongs should be located so that they may readily be heard throughout the building.

d. Manual control switches or fire gongs should be available at fire danger points and within 200 feet of any point on the same floor level, or 100 feet plus a flight of steps. Controls may operate automatically in connection with sprinkler systems in fire danger zones.

13. Is the building structurally sound? (5)
Suggested Criteria:
a. Foundations should support the building without shifting or sinking or cracking.
b. Walls should be free from cracks; junctures of walls should be aligned.
c. Floors should be level.
d. Floors and stairs should be rigid.
e. Parapets, chimneys, and walls should be plumb and in good condition.

14. Is the interior of the building free from inflammable materials and equipment? (5)
Suggested Standards:
a. Curtains and draperies of inflammable materials should be treated with substances which will make them flame resistant.
b. Waste paper should be baled and stored in a fireproof place or disposed of daily.
c. Oily rags, paints, or varnish should be discarded in airproof metal containers and disposed of regularly.
d. Accumulations of coal dust or other inflammable substances should be prevented.
e. Attic spaces, if present, should not be used for storage of inflammable materials.

15. Are stairways safe? (5)
Suggested Standards:
a. Stairs should be completely fire resistive.
b. Stairs should be well lighted and at least 4 feet wide.
c. Stairs should be provided with firm handrails.
d. Stair treads should be of nonskid materials, at least 10 1/2 inches wide, and with risers of about 6 1/2.
e. Stairs with more than a 10-foot rise should have an intermediate landing with a length of not less than 4 feet.
f. Ramps, rather than stairs, should be used where the rise is three steps or less.

16. Are floors free from projections and slippery surfaces? (3)
    Suggested Standard:
    Floors should have nonskid surfaces and should be free from projections such as splinters, broken tile, etc.

17. Are corridors and exits safe, sufficient in number, properly located, large enough, and provided with direct outlets? (5)
    Suggested Standards:
    a. Corridors should give direct access to every room so that it is unnecessary to go through any classroom to reach another.
    b. Corridors without lockers should have a minimum width of 104 inches, with greater widths as indicated by traffic flow. Where lockers are present in corridors, add 1 foot if lockers are on one side only and 2 feet if lockers are placed on both sides.
    c. Corridors and exits should be capable of discharging all students from the building within 3 minutes.

18. Are corridors free from projections and sharp corners? (3)
    Suggested Standards:
    a. All drinking fountains, radiators, display cases, etc., should be recessed.
    b. Doors, when open, should not project into corridors.
    c. All corridor corners should be well rounded or splayed and sharp projecting corner molds should be avoided.

19. Is the hazard of fire eliminated as far as possible in the construction of the building? (10)
    Suggested Standards:
    a. The building may be of a 1-story type which is easily and quickly evacuated, or of a multi-story construction with a high degree of fire resistance.
    b. Arrangement of the building should isolate the heating plant.

20. Are building exit doors free from hazards? (5)
    Suggested Standards:
    a. Exit doors should all open outward.
    b. Exit doors should be equipped with panic bolts or pressure operating locks.

21. Are exit doors well marked? (2)

Suggested Standard:

Exit doors should be plainly marked in white and green or red and white. For night, illuminated overhead signs should be provided.

Total Safety Rating _____

IV Healthfulness of the School Plant

This term refers to the degree to which pupils are insured freedom from dirt and excessive noise, and provided with satisfactory facilities for lighting, heating, ventilation, and sanitation, and a plentiful and convenient supply of pure water. In general, the features of the building designed to protect and promote the good health of the pupils are covered in this category.

Site

1. Is the site located in a place free from odors, dirt, noise, and industrial gases? (10)

2. Is the surrounding area free from saloons, taverns, and similar establishments? (10)

3. Are drinking fountains conveniently provided on the playgrounds? (5)

4. Are students comparatively free from exposure to inclement weather throughout the day? (10)

   Suggested Provisions:

   a. A portico or similar shelter for pupils on and off buses.
   b. Enclosed walks where pupils pass from one building unit to another.

Pupil Rooms

5. Are all classrooms, special rooms, corridors, and other areas properly lighted? (15)

   Suggested Standards:

   a. Light should be of the proper intensity as indicated below:

	Footcandles
(1) Sewing rooms, drafting rooms, and classrooms for partially seeing children	50
(2) Classrooms, shops, and laboratories	30

(3) Gymnasiums and swimming pools 20
(4) Auditoriums, cafeterias, reception rooms, locker rooms, washrooms, stairways, and corridors containing lockers 10
(5) Corridors and storerooms 5

b. To keep brightness of finishes within desirable ranges the reflection factors of various finishes should be as follows:

	Reflection Factor
(1) Ceilings	80%
(2) Side walls	60%
(3) Wainscoting and trim	40-60%
(4) Floor, desks, and other equipment	30-40%

c. There should be no glare from windows, light fixtures, desks, glass, or other glossy surfaces.
d. Blinds should be provided at exterior windows.

6. Are pupil seats adapted to age and size of pupils? (10)
Suggested Standards:
a. Backs should fit comfortably into chairs and feet should rest on floor.
b. Seats should be adjustable as to height; desks should be adjustable as to height and angle of desk tops.

7. Is the heating and ventilation satisfactory? (10)
Suggested Standards:
a. Rooms and corridors should be free from stale or odorous air.
b. Temperatures of classrooms, auditoriums, offices, and cafeteria, measured at a height of 30 inches from the floor, should be approximately 70 degrees.
c. Temperature of activity rooms, measured at a height of 60 inches from the floor should be approximately 65 degrees.
d. Temperature of closed corridors, stairways, shops, laboratories, etc., measured at a height of 60 inches from the floor should be approximately 68 degrees.

General Features

8. Are a sufficient number of sanitary drinking fountains provided in corridors, gymnasium, auditorium, and elementary classrooms? (5)
   Suggested Standard:
   One on each floor for every 75 pupils for whom fixtures are not provided, and convenient to all separated areas used by pupils, adults, and the general community.

9. Are toilet facilities adequate and sanitary? (10)
   Suggested Provisions:
   a. Room units for primary grades.
   b. One unit for every 30 pupils in elementary schools with a minimum of two water closets per toilet room. Water closets and urinals should be provided in an equal ration in boys' toilet rooms.
   c. Toilet rooms and facilities should be of a smooth, moisture resistant finish which may be scrubbed and flushed clean.
   d. One lavatory unit per 40 pupils.

10. Is an analysis of the school's water supply made at least once each year? (5)

11. Is sufficient cleaning equipment provided? (5)
   Suggested Provisions:
   a. A portable or integral vacuum cleaning system.
   b. Brushes, mops, cleaning compounds, germicides, and other equipment and material needed to adequately maintain rooms and equipment.

12. Is the building free from dirt-catching, hard-to-clean areas? (5)

Total Healthfulness Rating _____

V Accessibility of the School Plant

This term refers to the proximity of the school to the pupil population center of the area served, the character of approaching roads and streets, as well as to a few general building and site features affecting ease of access to the building.

Site

1. Is the school located at the approximate center of the present and probable future pupil population? (20)
   Suggested Aid:
   A spot map showing the location of preschool children as well as children enrolled in school will enable the evaluator to readily score this item.

2. Is the distance traveled by all pupils within accepted maximums? (25)

Suggested Maximums (one way):	Walking	Bus
a. Grades 1-3	1/2 mile	30 minutes
b. Grades 4-6	3/4 mile	30 minutes

3. Are sidewalks, streets, and roads traversed by pupils on their way to school improved? (10)

4. Are the playground and outdoor work and recreational areas easily accessible to pupils who use them? (10)

   Suggested Standards:

   a. There should be direct access to outdoor work areas from the elementary classroom.

5. Are both vehicle and pedestrian approaches and entrances to the building ample in size and conveniently located? (5)

6. Are connections with utilities and sewage systems available? (10)

Pupil Rooms

7. Are wardrobes and lockers easily accessible to pupils who use them? (10)

   Suggested Provisions:

   a. Elementary pupils' cloak storage provided in an adjoining room or in specially adapted areas in the room.
   b. Supplementary lockers for storage of street and special purpose clothing, and project work, provided in shops, laboratories, and physical education departments where indicated.

General Features

8. Are service and general service provisions readily accessible? (10)

   Suggested Provisions:

   a. Electric outlets accessible without use of long cords.
   b. At least one boys' and one girls' toilet room on each floor.
   c. Readily accessible drinking fountains.

Total Accessibility Rating _____

VI Flexibility of the School Plant

This term refers to the possibility of change, as incorporated in the construction of the building and the development of the site, to meet new demands as the curriculum changes.

Site

1. May recreational areas, with simple changes in design, be used for several purposes? (15)
   Suggested Criteria:
   Paved outdoor areas equipped with removable posts, set in metal sleeves which are capped when the posts are removed, offer play space for a variety of games.

Pupil Rooms

2. Can rooms for evening school, public entertainments, and community use be isolated from unused areas of the building? (10)
   Suggested Provisions:
   Recessed doors or grills which may be extended to close off corridors.

3. Are rooms so arranged that multiple use is feasible? (10)
   Suggested Provisions:
   a. Special classrooms with movable facilities for adult and community use.
   b. Special classrooms, laboratories, and shops flexible enough for use in teaching academic subjects.

4. Do rooms have the flexibility necessary for multiple-room supervision? (10)
   Suggested Provisions:
   Special or departmental classrooms and workrooms with openings, separating counters or shelving. If glazed partitions are used they should be engineered and children should be seated to avoid glare within any child's working field of vision.

5. Are seats, tables, shelves, cases, etc., movable and versatile? (10)
   Suggested Criteria:
   a. Tables and chairs should be separate so that both may be arranged in units or interchanged between rooms for various types of work.
   b. Shelving and cases should be of interchangeable unit sizes.

c. Shelving and cases should be of free-standing construction to permit formation of separated work areas.
d. The elimination of glass surfaces from doors, cabinets, and pictures will permit greater flexibility of seating arrangements by minimizing sources of glare which might come within the child's field of vision.

6. Are lights, heaters, and ventilators arranged in units which may be controlled separately? (10)
   Suggested Criterion:
   Banks of controls for areas of the room so that moving walls will not necessitate expensive utility changes.

7. Are service facilities so placed that inter-room walls may be shifted? (10)
   Suggested Standard:
   Service facilities should be in plenum chambers above corridors or classrooms, or in service ducts under corridor floors or in corridor walls.

General Features

8. Is fenestration such that shifting inter-room walls poses no window problem? (10)
   Suggested Standard:
   There should be a continuous bank of windows, or windows should be grouped in small units.

9. Are most walls between adjacent rooms nonload bearing and readily movable? (15)
   Suggested Criterion:
   Inter-room walls made of movable units of frame and panel construction, or of light weight aggregate blocks, are readily moved.

Total Flexibility Rating _____

VII Efficiency of the School Plant

Efficiency is the securing of maximum effect with a minimum of effort. An efficient building makes possible the reduction of pupil travel to a minimum, provides convenient custodial facilities, isolates areas of noise, and have facilities located for maximum utilization.

Site

1. Is the building so located that a maximum area of the site is readily available for pupil use? (10)
   Suggested Standard:
   Building and landscaped areas should be so situated that the play space is not cut up into areas too small for play or segmented in such a way as to reduce usefulness.

2. Is the landscaping of a nature that requires a minimum effort of the caretaker in maintenance? (3)
   Suggested Criterion:
   Landscaping plans should provide for unbroken expanses of lawn with shrubbery grouped in plantings rather than isolated as specimens.

3. Are provisions for watering lawns and shrubs efficient? (2)
   Suggested Criterion:
   Hose connections should be available so that any portion of the landscaped area may be serviced with a hose of not over 150-foot length.

4. Are walks conveniently arranged so that there is no tendency for pupils to walk over lawns and shrubs? (5)
   Suggested Criterion:
   Walks and drives should be direct or give the impression of being so.

5. Are play areas so located that pupil traffic is quick and easy between them and the building? (7)
   Suggested Standard:
   Areas of play should be readily and quickly accessible to pupils coming from the building. Pupils should not have to cross driveways and parking areas to reach play spaces.

Pupil Rooms

6. Does the layout of the building permit quick and easy pupil movement from place to place without congestion? (15)
   Suggested Criteria:
   a. Rooms, laboratories, and shops having correlated activities should be grouped together.
   b. Administrative offices and general service rooms, such as the library and gymnasium, should be centrally located.

General Features

7. Are the corridors and stairways free from "bottlenecks" in pupil traffic? (7)
   "Bottlenecks" are defined as narrow passages which tend to congest pupil traffic and delay the movement of pupils from place to place.

8. Are corridor floors durable and earily cleaned? (3)
   Suggested Criterion:
   Corridor floors should preferably be of linoleum or asphalt tile laid on a concrete base.

9. Can visitors and pupils locate various rooms without difficulty? (3)
   Suggested Criteria:
   a. The location of such facilities as the principal's office, restrooms, auditorium, etc., should be indicated by signs or a directory in the corridor near the main entrances.
   b. Rooms should be well marked.

10. Is there an efficient communication system in the building? (3)
    Suggested Criteria:
    a. Extension phones should be available on every floor, and an intercommunication system should be provided in larger school buildings.
    b. Pupil phones and public phones should be provided in the lobbies of the auditorium or gymnasium.
    c. An automatic program clock system should be provided, with a manual signal to be used in cases of changes in programs.

11. Is the building free from unnecessary noise? (10)
    Suggested Standards:
    a. Floors should be resilient where not otherwise specially indicated.
    b. Unit heaters and ventilators should be provided in all rooms where high level of sound arises.
    c. Large blade, slow moving convection fans should be used to minimize fan noise from central ventilating systems.

12. Are storage spaces, lockers, and closets located for efficient use? (10)
    Suggested Criterion:
    Storage spaces for equipment and pupil clothing should be easily accessible to the users of such facilities.

13. Is the building easily cleaned? (10)

Suggested Criteria:

a. Corners should be rounded or beveled, and ledges, recesses, etc., avoided where possible.
b. Wainscoting and walls should permit easy cleaning.
c. Outlets for vacuum pipe system, vacuum cleaning units, and scrubbing and maintenance machines should be provided with connections available so that 50 feet of hose or electric cord will service any part of the building.
d. Custodial closets with slop sinks, hot and cold running water, and storage space for supplies and equipment should be available on every floor.
e. Custodial closets with storage space for mowing machines, and yard tools and equipment, should be available at ground level.

14. Does the building construction facilitate the delivery, storage and handling of fuel? (5)

Suggested Criterion:

Fuel bins should be readily available from the service drive, and storage bins should be located adjacent to the furnace room.

15. Are service systems free from leaks, stoppages, freezing, and mechanical difficulties? (7)

Suggested Criterion:

Temperatures and air changes should be suitably maintained without undue line losses or overloading of heating or fan devices.

Total Efficiency Rating _____

VIII Economy of the School Plant

Economy is the achievement of proper plant operation at minimum cost. The economical school plant fully utilizes natural light, and conserves heat, electrical energy, and water.

Site

1. Is the site and its development of a nature to require only a minimum of expense in maintenance? (10)

Suggested Standards:

a. Shrubbery and landscaping plants should not be of such a nature as to require extensive care, pruning, cultivation, and trimming.

b. The site should be continuous so that machinery and tools need not be duplicated or dependent on transportation.

2. Does the arrangement of play areas provide that children of similar ages may share play facilities? (5)

Pupil Rooms

3. Can areas of the building used by the community be heated and ventilated separately? (10)
   Suggested Criterion:
   Heating and ventilation should be of a type which permits separate service to these rooms.

General Features

4. Does the location of the building and its construction make maximum use of natural light? (5)
   Suggested Standards:
   a. Trees and adjacent buildings and structures should not obstruct daylight.
   b. Windows should extend the full lenth of the classroom, from a height about eye level with seated pupils, to the ceiling. A vision strip should be provided, but the upper portion of these windows may be of prismatic glass block.

5. Does building construction and location permit economical use of fuel? (15)
   Suggested Criteria:
   a. Window area should be held to a minimum on the side of the building facing prevailing cold winter winds.
   b. Tree plantings may serve as windbreaks against prevailing cold winds and as air funnels for prevailing breezes during warm months.
   c. Windows and doors should be kept in good repair and weather stripped where the climate indicates such treatment.

6. Does building construction and wiring permit economical use of electricity? (5)
   Suggested Criteria:
   a. Electric service should deliver acceptable voltages at peak loads.
   b. Circuits for areas such as classrooms and corridors should permit selected patterns of lighting.

7. Does building construction and furnishing permit economical upkeep? (20)
   Suggested Criteria:
   a. Floors, table tops and desk tops should require a minimum of resurfacing during their lifetime.
   b. Wainscoting should resist scuff marks.
   c. Tile wainscoting should not be more extensive than demanded by the activity of the room.
   d. Furnishings should be of simple functional design and avoid expensive ornamentation.

8. May repairs to service systems be made at minimum costs? (10)
   Suggested Provisions:
   a. All utility lines should be readily available for inspection and repair.
   b. Service system fixtures should be of standard size.

9. Is the building free from unusable space? (15)
   Suggested Criteria:
   a. Attics, basements, and excessive storage, corridor, and room space should be avoided.
   b. Room and corridor heights should be held to a minimum which will conform with health standards and local and state requirements.

10. Are entrance areas provided with outer and inner doors to minimize heat loss? (5)

Total Economy Rating _____

IX Expansibility of the School Plant

Expansibility refers to the possibility for enlargement of the building and site to meet educational needs. Building expansibility is usually achieved through open-end construction and provisions for future enlargement of heating, lighting, ventilating, and plumbing systems.

Site

1. Can the areas of the site used for various activities be expanded easily? (15)
   Suggested Criteria:
   a. In order to be expansible a site should contain enough undeveloped land, and be so planned, to permit enlarging the areas used by different age groups of pupils for nature study, gardening, play, etc., or. . .

b. The site should have adjacent open areas which are readily obtainable as needed, since expansion is difficult and costly where the surrounding areas are built up.

2. Does the location of the building on the site allow for its expansion without difficulty? (10)
   Suggested Criteria:
   a. The building should be located so that the planned direction of expansion or development does not isolate physical education, work or play areas.
   b. The building should be located so that future expansions do not interfere with service system entries or repairs.

Pupil Rooms

3. Are special rooms, gymnasium, cafeteria, etc., so located that expansion of the building will leave them readily accessible? (10)
   Suggested Criterion:
   The building should be planned so that general service facilities will be conveniently located when the building is expanded.

4. Are gymnasium, cafeteria, and similar general service facilities large enough in case of expansion? (15)
   Suggested Criterion:
   General service facilities should be sufficiently large to accommodate 20-30% more pupils.

General Features

5. Are service facilities adequate to meet needs of an expanded building? (10)
   Suggested Standard:
   Service facilities such as lighting, heating, and water should be adequate to care for the needs of the ultimately considered maximum enrollment of an expanded building.

6. Do traffic provisions allow for expansion in building? (10)
   Suggested Criteria:
   a. Corridors should end in full size outside exits or small temporary rooms wherever expansions or additions are ultimately possible.
   b. Stairways should be placed off of corridors rather than at the end of corridors.

7. Does the plan of construction permit easy expansion to the building? (15)

   Suggested Standards:

   a. The building should be placed on the site so that planned additions or expansions will not necessitate expensive fills or cuts.
   b. The building should be planned so that additions will be integrated into the design.
   c. Service facilities lines should terminate at points where planned additions or expansions will take place.
   d. Adequate natural lighting should be provided by windows located other than on walls where planned expansions or additions are to take place.

8. May expansion be made without weakening the original structure? (15)

   Suggested Standard:

   Walls should be nonload bearing at points where expansion is planned.

Total Expansibility Rating _____

X Appearance of the School Plant

Appearance refers to how the school looks and whether it is pleasing to the eye. Attention is directed to landscaping, color harmony, appropriateness of furnishing, and use of decoration.

Site

1. Is the site environment attractive? (5)

   Suggested Standard:

   The school site should be surrounded by a well-kept residential area, a park, or open country.

2. Is the site attractively planned and landscaped? (15)

   Suggested Criteria:

   a. A portion of the site to the immediate front, and perhaps side, of the building should be placed in lawn, with shrubs and trees so located as to contribute to the appearance of the school plant.
   b. The building should be orientated so that its best elevation faces the most used approach.
   c. Plant or shrub screens should be used to hide unsightly areas and to separate drives, and parking and play areas, from the remainder of the site.

3. Are the grounds neat and well kept? (10)
   Suggested Criterion:
   Hedges and shrubbery should be kept closely trimmed, grass mowed, and weeds eliminated.

Pupil Rooms

4. Are the rooms in which pupils work cheerful and attractive? (20)

General Features

5. Does the building "fit" into its location? (5)
   Suggested Standards:
   a. The building design should be consistent with that of the best buildings of the community in which the school is located.
   b. The building, if one story, should be set back from the street at least 50 feet or, if more than one story, about twice this distance.

6. Are the building lines clean, symmetrical, and free from excessive ornamentation? (10)

7. Do the various sections of the building harmonize in design? (5)
   Suggested Criterion:
   It is not necessary that additions to buildings be of the same design as the original structure, but newer parts of the building should harmonize with the old in order to rate high on this item.

8. Is the building kept neat and in good repair? (10)
   Suggested Criterion:
   Cracks in walls and ceiling, peeling paint, crumbling masonry, and similar marks of deterioration detract from the appearance of the building.

9. Is the interior finish attractive and suited to the use and exposure of individual rooms: (15)
   Suggested Standards:
   a. Color schemes should be light and attractive. Ceilings should be white, or an off-white, with upper walls somewhat lighter than wainscoting.
   b. Color schemes should vary from warmer colors in rooms with northern exposures to cooler colors in rooms with southern exposures.

c. Color schemes should vary from room to room with judicious use being made of accent colors of primary hues.
d. Color schemes should be psychologically pleasing with extremes of exciting, stimulating, or depressing colors avoided.

10. Is the effect of furnishings and fittings harmonious with the finish of floors, walls, and ceilings? (5)

Suggested Standards:

a. A light, non-glossy finish of suitable reflective qualities should be used on tables, chairs, desks, and all unpainted woodwork.
b. Painted woodwork should be light in color, with window trim especially in light shades.
c. Floors should be light, and preferably neutral in color, to facilitate periodic changes in color schemes.
d. Draperies and hangings should be of an attractive design, and should harmonize with the color scheme of the room.

Total Appearance Rating _____

Total Plant Rating _____

APPENDIX B

ALTERATIONS TO EVALUATION INSTRUMENT

This Appendix contains alterations to the Citizens Workbook for Evaluating School Buildings by Landes and Sumption which were produced by the Detroit Board of Education. These alterations, specifically termed an Addenda, were prepared to assist citizens in more accurate evaluations of the public schools within the Detroit School System. This Addenda has been accepted as partially representing the Base Educational Program rated within this study.

The statements which follow refer specifically to the functions and items in the Citizens Workbook.

I ADEQUACY

1. For the purpose of this evaluation it is requested that the size of the school site be evaluated in terms of the "Suggested Standards" on the pages of the Workbook.

This is justified. When we consider that cities and towns throughout the nation are moving toward a minimum of five acres plus one acre for each 100 children of expected enrollment, we realize the considerable problem involved in obtaining sufficiently large areas for school needs. While some might say that a standard of five acres would be ridiculous for the city of Detroit, one need only point out that children attending Detroit elementary schools generally reside in extremely congested areas, and therefore need outdoor space at school even more than children who have sufficient play space around their homes.

In computing the adequacy of the school site over-all, it is permissible to include property owned by the Department of Parks and Recreation as long as it is contiguous and available for the purposes listed below. For several years it has been the policy of the Department of Parks and Recreation to provide at least part of the community recreation areas as extensions of existing school sites.

The basic criterion is that the site shall readily accommodate all the activities required in the present and future program. The following list suggests some of the kinds of spaces needed in a school site to qualify it as a truly workable part of an educational facility.

Items to be considered:

a. Space for the building.
b. Space for future additions to the building.
c. Space for the lawns. The building should not be closer than 100 feet to any edge of the site.
d. Space for the walks and driveways including front entrance driveway, service entrance driveway, and walks to all entrances.
e. Parking space for teachers, pupils, visitors, for community use of buildings, and for attendance at athletic contests.
f. Paved area for pupil use when turf is wet or soft and when frost is leaving the ground.
g. Space for loading and unloading.
h. Segregated play area for kindergarten children.
i. Segregated play area for children in lower elementary grades for unorganized activity.
j. Play area for upper elementary grades, to include provisions for touch football, soccer, basketball, softball, and possibly tennis. These areas must cover needs of both boys and girls without conflict in use.

. . .

m. Alternate space for use when turf on other areas needs rest or renewal.
n. Margin for future possible expansion of activities.

3. d. An indication of the amount of space required per auto is as follows:
    1. If the parking area provides parking of autos end to end, allow a space of 25 ft. x 10 ft. for each auto.
    2. If the parking area provides parking of autos side by side, allow a space of 20 ft. x 10ft. for each auto.

4. Revise this standard to read: Play areas should be large enough so that all pupils scheduled to use the play areas at any one time have enough room to play without undue hazard.

9. See "Enrollment Projections" (Supplementary Standards). This question cannot be answered for any one year, but rather it must be answered in terms of the entire term of the over-all plan. In other words, the capacity of a building must be viewed as being adequate to some degree in terms of peak enrollment for the ten-year period.

For example, Building X has a capacity of 500 pupils. At present it has an enrollment of 450. In 1958 there is an enrollment projection of 500 pupils, and so on until 1962 when the enrollment projections forecast an increase to 550 pupils. From 1963 to 1965 the enrollment projections forecast a stable enrollment of 550.

Using the table below, Building X would be considered adequate and would be given the full 15 points credit in the workbook.

On the other hand, if Building X had had an increase to 650 pupils forecast for 1962, and the 650-pupil forecast continued through 1965, it would have an enrollment forecast of 30 per cent above capacity.

Consequently, this situation could not be considered adequate for the entire term of the program.

In the event of an experience like the one immediately above, a note should be made in the workbook to indicate that the building will be adequate in terms of capacity until 1961, but that something will need to be planned to alleviate a crowded situation from 1962 to 1965. The workbook will be scored according to the degree of overcrowding, using the table below as a guide.

ADEQUACY OF BUILDING CAPACITY
IN TERMS OF ENROLLMENT PROJECTIONS

Percentage above Capacity			Degree of Adequacy in terms of Workbook Score
0%	to	4.9%	15 Points
5%	to	6.9%	13 Points
7%	to	8.9%	11 Points
9%	to	10.9%	9 Points
11%	to	12.9%	7 Points
13%	to	14.9%	5 Points
15%	to	16.9%	3 Points
17%	to	18.9%	1 Points
19%	to	20.9%	0 Points

13. e. For visiting teacher, health examinations or individual testing.

16. Refer this question specifically to the engineer.

II SUITABILITY

2. This question should be answered in terms of ordinary evidence of plant growth, as an attempt to evaluate the soil scientifically in terms of the suggested standard would require a chemical analysis which should be done only in those instances where plants are not thriving.

3. No playground equipment is currently being purchased by the Board of Education, nor has playground equipment been purchased in recent years. Playground equipment would include such items as slides, swings, seesaws, etc.

In those instances where playground equipment is found in operation on a school site, it is there either because it was purchased some years ago, or it belongs to the Parks and Recreation Commission, or it was purchased by a community group. This question should be evaluated in terms of the suggested standard.

4. This question should in all cases be marked two (2), except in those cases where evidence of cracking, etc. has occurred.

8. This question applies to classrooms only, and not to auditoriums or other spaces requiring fixed furniture. This question assumes that it is desireable to have flexibility within the individual classroom to make possible the many activities inherent in current instructional techniques.

9. It is desirable to have sinks in at least the following rooms: art, instrumental music, science, and primary classrooms (including kindergarten and grades 1 and 2).

13. The Architectural Planning Department, after research and consultation with the Educational Staff, considers that gray chalkboards are suitable for classroom use.

19. Any elementary schools that does not provide for study and practice of typing should be scored zero on this item.

22. A rule of thumb suggests that a school building should have an assembly space which will accommodate one-half of the student body at one time.

23. The existing policy with regard to including kitchen and dining room facilities in Detroit Schools is as follows:

> Elementary Schools.--Cafeteria facilities will be included in a building when 150 or more hot lunches are considered average need.

24. (Further explanation of the suggested standard) In years gone by, it was an acceptable practice in school construction to plan separate cloak rooms for each classroom. It was also an earlier-day practice to ventilate the cloak room with air that came from the corridor, through the cloak room, and subsequently into the classroom.

Today it is common practice when cloak lockers are located in corridors to ventilate them into the corridor air stream. When cloak lockers are located in a classroom, it is common practice to ventilate the cloak lockers or wardrobe with the classroom air by exhausting the classroom air through the cloak area.

25. (Explanation of Suggested Standard) This question implies that lockers should not be located in locker alcoves off corridors, but rather in classrooms or corridors in elementary schools and in corridors in secondary schools.

29. c. This question should be evaluated in terms of the suggested standard. It has been the aim of the Board of Education to provide one-story or no more than two-story elementary school buildings when possible.

30. Delete in the suggested standard the reference to shades being double hung, as it is Detroit policy to use only a single shade.

III SAFETY

1. This suggested standard especially applies to elementary pupils. If any children have to cross a major traffic artery, this constitutes a negative feature of accessibility.

2. It is recognized that with two and four motor airplanes the landing approach pattern and the taking off flight might extend for miles and cover much of the city, consequently passing over many schools.

The evaluating team should not attempt to answer this question technically, but rather it should ascertain whether or not airplanes regularly pass immediately overhead either landing or taking-off. If the above condition exists, this question should receive a negative rating.

3. This question refers specifically to those industrial enterprises which present a definite physical hazard and not those which might only present a poor environment.

6. A minimum standard for the separation of play areas would include either an isolated or fenced-off area for the kindergarten as well as for the first and second grades.

This item presupposes that more than one age group will be using a playground at one time. When scoring this item, take into account whether or not more than one age group regularly uses the playground at the same time.

10. e. Exposed radiators.

11. d. The Official Building Code of the City of Detroit does not require more than one three-foot in any pupil room designed to house less than 100 children. This code applies to fire-resistive structures as well as combustible structures.

13. f. This item, when read quickly, seems to suggest that the authors expect lay citizens (a term which, in this instance, would include educators) to evaluate the structural soundness of a building. A closer reading reveals that the authors have only assigned a relatively minor possible score to the item, undoubtedly assuming that expert architects and structural engineers would make a professional decision as to the soundness of the structure. A structurally unsound building would either have to be immediately made sound or abandoned for school use, as there is no question that an unsound building presents a physical hazard to its occupants.

Consequently, for the purposes of this evaluation the evaluation team should attempt to rate very simply (using the criteria suggested) the building in question.

14. g. Regulations of the Board of Education and the City and State Fire Marshal provide the following additional standards which should be observed:

f. No more than 10 (ten) gallons of inflammable liquids may be stored in a school building at one time.

g. All inflammable liquids must be stored in a metal cabinet of some kind at all times.

h. No material, including janitors' supplies and equipment, shall be stored beneath stairways, even if the stairway is of fire proof construction.

21. The Detroit Building Code requires that each exit from the building be marked with a fixture indicating the word "EXIT" and lighted with a red lamp.

HEALTHFULNESS

1. Make a note indicating the sources of excessive odor, dirt, noise and industrial gasses.

2. Make a note indicating the location of all saloons, taverns and similar establishments in the immediate school neighborhood.

3. Make a note indicating the location of present playground drinking fountains.

4. It has been the policy of the Board of Education to allow children to enter buildings in inclement weather, at the discretion of the building principal. This question should be evaluated in terms of the actual policy of the principal concerned.

5. Please view the suggested standard as no more than academic information. The suggested standard supplies the kind of guides a professional illuminating engineer would use in evaluating the adequacy of a lighting installation in a school building. For the purposes of this evaluation, it will suffice to view the rooms of the school as though they were rooms of a home. For instance, a person would not need to measure light in order to know that there is not enough light present in the usual basement or cellar to read comfortable for any length of time. A room that is too bright for comfort is also easily recognized. For example, a small kitchen would be too bright if it contained a large fluorescent lamp and had walls and ceiling of glaring white enamel.

Below is found a summary discussion of recent statements concerning intensity of light and brightness contrast, two of the most important aspects of balanced lighting.

Intensity of light. - There must be sufficient natural light entering the room under all except the most unfavorable weather conditions, and it must be so evenly distributed that there will be a sufficient intensity of light upon each working surface to enable the work to be carried on with convenience and ease. Nobody can say exactly how many foot-candles are necessary, but the trend of opinion has favored increasing intensities in recent years to the point where there is a fair agreement that at least thirty foot-candles of light are necessary on a desk top for reading, writing, and other similar activities.

Brightness-Contrast. - Not only must there be sufficient light, but also the light must be so reflected from surface to surface and thence to the eye that there will be no uncomfortable brightness-contrast between the task upon which the attention is focused and the rest of the visual environment. Good seeing conditions mean relatively low contrast between the background of the task and other areas which border it.

Probably the best way to make this possible is to have a great deal of light coming into the room from more than one wall with direct sunlight cut off or diffused through glass blocks or by baffles and to have the ceiling and upper walls so finished that they will reflect 85 per cent or more of the light which strikes their surfaces but without pronounced glare from smooth and shining finishes. Over and beyond this, however, all of the furniture and equipment, floors, and lower wall surfaces should reflect substantial amounts of light even up to 45 to 50 per cent reflection values.

Artificial Lighting. - Since there are times when even the best of fenestration cannot provide sufficient natural light on cloudy days, it is wise to have well designed artificial light facilities, even though the rooms are not intended for evening work. Rows of double fluorescent units seem to be gaining favor although there are many who prefer the equivalent intensity of incandescent light. For buildings which are to be used for night work, the artificial illumination must be made adequate to provide suitable complete lighting.

7. e. All recent heating plant installations have been engineered to maintain comforable indoor temperatures for prevailing climatic conditions. The capacities of the heating plants are based on a 0°F outdoor temperature and indoor temperatures of 70°F.

For the purpose of this evaluation, it would be advisable to take temperature readings as suggested before rating this question.

9. The Detroit Building Code indicates the following standards, and basically they are the same as the standards suggested in the workbook:

a. One water closet per 30 girls with a minimum of 2 water closets per toilet room in both elementary and secondary schools.

b. One urinal per 30 boys with a minimum of 2 urinals per toilet room in both elementary and secondary schools.

c. One water closet per 50 boys with a minimum of 2 water closets per toilet room in both elementary and secondary schools.

d. One lavatory per 60 boys with a nimum of 2 lavatories per toilet room in both elementary and secondary schools.

e. One lavatory per 60 girls with a minimum of 2 lavatories per toilet room in both elementary and secondary schools.

f. Each building should have toilet facilities for adults separate from those for pupils.

A simple technique for computing the adequacy, in numbers, of water closets, urinals, and lavatories is to:

1. Add all boys' units together and divide by the male enrollment.

2. Add all girls' units together and divide by the female enrollment.

3. All adult provisions should be included in either 1 or 2 above.

Make a note indicating toilet facilities which need complete modernization if they are to meet modern standards of sanitation.

10. City water is supplied to all Detroit school buildings, and it is continuously analyzed. This item should be awarded full credit.

12. This question makes reference to such situations as: entrances which don't have recessed mud mats, rough concrete floors which are very difficult to sweep and cannot be dust-mopped, etc.

V ACCESSIBILITY

1. This item will have to be evaluated in terms of the principal's estimate of the centrality of the school to the present and probable future pupil population, as spot maps are unavailable.

5. Pedestrian approaches to a building should follow the most logical pattern. For instance, it is not advisable to construct a semi-circular concrete walk at the front entrnace of a building when it is known that a bus, which many students use, stops directly opposite the front entrance. This situation would present the problem of preventing students from taking the most logical route which would be a direct line, across the lawn, from the front entrance to the curb and bus stop.

Vehicle roads should not cross pedestrian walks if at all possible, especially once on the school site.

It is also advisable to provide enough space in delivery zones so that delivery trucks may turn around and not be forced to back out a driveway. Trucks, busses, and automobiles proceeding in reverse have caused the injury of many pupils.

Make a note indicating the existing approach patterns which present a hazard for pedestrian traffic.

7. d. "Suggested Provision" (a) applies only to older buildings. In recently constructed Detroit elementary school buildings, pupil cloak lockers have been provided in corridors and not in special rooms or wardrobes within the classroom. Providing pupil cloak lockers in corridors is made necessary as a result of the Detroit Plan of Organization.

VI FLEXIBILITY

2. Physically isolating sections of a building, such as an auditorium, gymnasium or cafeteria, is a relatively simple and inexpensive matter. Complete isolation of a building would also include the zoning of the heating system and is a more costly provision. The City Fire Code makes mandatory that the section being closed off have available enough exits to handle the occupants using the facility.

Elementary schools, in general, do not have recessed doors or grills which can be used to isolate sections of the building. Secondary schools do have the means to isolate some sections of a building. Buildings regularly used by community groups should have facilities for isolating those areas not to be used.

5. Almost all of the currently purchased pupil desks and chairs are of the movable type; they are either in one unit, with the chair attached to the desk, or as two separate pieces.

Bookcases, shelves and cabinets of various types and sizes have not been purchased as movable units; but rather, they are most always built in when the school is constructed.

The major portion of the pupil furniture currently in the schools is of the fixed type.

6. This question implies that when a classroom has two or more rows of ceiling lights, each row should be separately controlled. This same idea would apply also to heaters and ventilators. The result of these kinds of arrangements would provide flexibility at relatively low cost by making possible the moving of partitions without the redesigning of lighting, heating or ventilating.

7. This question suggests that it is advantageous not to design duct or pipe spaces in walls that separate one room from another. If duct or utility pipes are hidden in walls that separate one room from another, the cost of moving the wall becomes prohibitive.

9. A load bearing wall is one upon which either an upper floor or a roof is supported.

Most walls in the recently constructed Detroit schools are non-load bearing. Most of those school buildings constructed during the 1920's and earlier have predominately load bearing walls and consequently they are very inflexible.

VII EFFICIENCY

4. When evaluating this question, it would be worthwhile to look for paths worn in the lawn area by pupils seeking more direct routes.

5. This question implies that corridor floors should be of a kind that is smooth and can be dry-mopped. It also implies that concrete floors which cannot be quickly cleaned and polished are not desirable in most cases.

VIII ECONOMY

5. This question should be referred to the school engineer.

6. This question should be referred to the school engineer.

7. The lower three or four foot portion of an interior wall is called wainscoting when it is finished differently from the upper part of the wall.

8. This question implies that all pipes, valves, traps, electric conduit, waste and feeder lines, etc. should be accessible without having to break through walls or partitions. It further implies that the above utility lines should be run through pipe trenches, through unexcavated spaces under the building or above corridor ceilings, where access for repair and maintenance is provided through doors of one kind or another.

IX EXPANSIBILITY

1. Because of the built-up nature of most of the Detroit school neighborhoods, there is little land available for the kind of expansion implied in this question. However, as we state in an earlier section, it is at present unimportant that this question does not reflect accurately the Detroit situation. In the final analysis all sites could be expanded by public condemnation of adjacent property.

3. This question implies that the central location of facilities used by all pupils is of prime importance and that a building is not ideally expansible when the existing main facilities are not so arranged as to be in the center of the possible directions of expansion.

4. This question implies that there are many factors which influence the expansibility of a school building. For example, it might prove too costly to expand the heating plant, or it might prove, as a result of a too small gymnasium, that it is unwise educationally to increase the capacity of the building any appreciable amount without major alteration to the main facilities.

X APPEARANCE

1. Briefly describe the immediate school neighborhood: e.g., "residential", "industrial", etc. Also indicate the environmental features of importance, such as a brewery, gas works, warehouses, etc.

APPENDIX C

POTENTIAL POINT DIFFERENCES BETWEEN BASE AND MODIFIED PROGRAMS

The material of this Appendix reflects the frame of reference within which the modified educational program was evaluated for this study. The plan of this Appendix follows the functions and items as recorded in the "Citizens Workbook for Evaluating School Buildings," by Landes and Sumption as duplicated in Appendix A. After each item is recorded by number, the reader will find subjective comments indicating alterations from the basic standards of the workbook as already modified by the Detroit Board of Education for each item (See Appendix B). These comments are supported, in many instances, by direct reference to: (1) recommendations made by the Detroit Citizens Advisory Committee which were approved by the Detroit Board of Education, (2) rehabilitation project reports, and (3) personal interviews. In addition it was deemed advisable to include the total points possible for each item as recorded in the work, and to state the potential difference by a precise point-value between the score determined by the evaluator for the base and the modified program. In other words, when one considers the possible point-value of any single item and the emphasis probably placed upon this item by the Citizens Advisory Committee, how much of a definite difference can be reasonably assumed would exist between the base and the modified programs? For instance, if an item in the workbook

indicates a possible point score of fifteen (15), and the Citizens Advisory Committee considered this general area as one imperatively needing improvement, it could be assumed that three points might be a reasonable difference; however, if that item could receive only a score of three (3) points, then one (1) point should be indicated as a reasonable difference.

The evaluation of the specific items in the workbook requires further elaboration for clarity. The points under the modified point difference are the maximum differences allowable for any given item to be considered reasonable. This difference could be an increase or a decrease from a score determined for the base program. Yet, the score for the modified program can never exceed the total points originally allotted for that item in the workbook, or conversely, the score can never be lower than zero. Thus, if an item had a possible point value of ten (10) with a determined difference of four (4) points, the maximum difference for this item would be four (4) points. If, however, the base program for this same item received a score of two (2), the potential difference could drop only to zero which would be a difference of two (2) points, while it could be increased to six points (the full measure of the potential difference). This precaution was deemed necessary to retain the validity and reliability of the basic instrument.

The potential point differences allowable by functions are summarized below:

Function	Total Modified Point Differences Possible
1. Adequacy	23
2. Suitability	23
3. Safety	13
4. Healthfulness	8
5. Accessibility	9
6. Flexibility	14
7. Efficiency	14
8. Economy	11
9. Expansibility	19
10. Appearance	19
Total	153

Within the following pages of explanation of the differences certain symbols are utilized to depict sections of the Citizens Advisory Committee's Recommendations. They are: C for Curriculum, SP for School Plant, and SC for School-Community Relations.

To repeat an earlier comment, the numbers designating items on the following pages correspond with those used in the workbook.

I ADEQUACY

Item	Comment	Possible Points	Modified Point Difference
1.	Additional considerations:	20	4
	a. First and second grades should be in self-contained rooms; third should be included where possible. (C-28).		
	b. Primary self-contained rooms should be located "...on ground floor with direct access to an outdoor area and near kindergarten play area." (Tilden, 24, p 11)		
	c. Outdoor space is needed to further nature study and activity. (personal interview)		
	d. Adaptability and flexibility should be considered in planning new buildings and rehabilitation of existing buildings. (SP-17)		
	e. Ideal acreage of a site for Detroit is between 5 and 5 3/4 acres. (25, p 48)		
3.	The evaluator is more critical on this item because of intended increase in community use.	3	1
4.	With additional self-contained classrooms can the children in these rooms play on the playground at the same time as those scheduled to be there?	5	1
5. and 7.	Additional considerations: (24)	10	2
	a. Self-contained rooms should be 800 square feet in size.		
	b. Multi-purpose areas should be 1200 square feet in size.		
	c. Upper elementary grades should be in rooms of 800 square feet.		
	d. Activities-assembly room should have 1800 square feet of usable floor space.		
	e. Art rooms should have 1000 square feet.		

ADEQUACY (CONTD)

Item	Comment	Possible Points	Modified Point Difference
5 and 7 continued.			
	f. Libraries should have between 800-1000 square feet. g. Vocal music rooms should have 800 square feet. h. Instrumental music rooms should have 700 square feet. i. Gymnasiums should be 40' by 60'. j. Remedial instruction space should contain 600 square feet.		
6 and 8.	These two items should be evaluated more critically because of recommendation C-3, quoted below: "Intensify present program of reading, writing, spelling, mathematics and science in all grades to make sure that all pupils have the best possible foundation in the basic subjects of the school curriculum."	5	2
9.	a. Capacity must be recomputed on the basis of an ideal of 30 pupils per classroom. (C-4) b. The total enrollment desired is between 600-800 pupils. (SP-3)	15	3
10 and 11.	These items require more critical scrutiny because of the desire to "intensity the present program." (C-3)	2	1
12.	This item calls for more critical scrutiny because of the desire to "intensity the present program;" (C-3) And because of library decentralization causes the need for larger spaces in rooms for instructional facilities.	3	1
13.	The following additions should supplement this item: d. Add - "on each floor." g. Add - "separate room for assistant principal for guidance." h. Add - conference room.	5	2

ADEQUACY (CONTD)

Item	Comment	Possible Points	Modified Point Difference
16.	This item demands more critical scrutiny because of one-story clusters of classrooms and decentralized heating facilities. (building plans)	3	1

II SUITABILITY

1 and 2.	These items become more critically important when self-contained classes may often explore outdoor areas.	2	1
3.	a. Additional development is necessary for self-contained rooms.	3	1
	b. There should be more critical evaluation of outdoor areas available.		
6.	This item demands more critical evaluation because of intention to intensify programs of "reading and science." (C-3)	3	1
7.	Intensifying programs (C-3) and decentralizing library space requires more adequate areas and facilities.	5	2
8.	a. This item applies, now, to the use of the auditorium for group work. (C-33)	3	1
	b. Flexibility and adaptability are general principles of planning. (SP-17)		
9.	This item bears consideration also in self-contained rooms in grades 1, 2, 3.	2	1
10.	This item calls for a more critical awareness of storage space problems because of intensifying programs.	1	1
11.	Facilities and materials need more critical evaluation because of: (a) intensifying program, and (b) decentralizing library.	5	2

SUITABILITY (CONTD)

Item	Comment	Possible Points	Modified Point Difference
13.	Facilities in self-contained rooms should be more critically evaluated.	3	1
14.	An intensified program requires a more critical evaluation.	5	1
17.	This item calls for a more critical evaluation because of an intensified program.	5	2
20.	More critical scrutiny is required on this item because of decentralizing the library and, therefore, making provisions for these materials within each classroom.	5	3
22.	This item calls for more critical scrutiny because of increased use of the building by the community.	2	1
23.	An intensified push for equal opportunity and increased plant use by the community requires more critical evaluation of this item.	3	1
24.	This item should be examined more critically because of greater community use of plant.	3	1
29.	This item should be evaluated extremely precisely because of desire to eliminate use of second story facilities on non-fire resistant buildings. (SP-8)	5	2

III SAFETY

3.	Include in the evaluation of this item all hazards which present a poor environment because of the quest for improved mental health.	5	1
5.	This item is more important now because of the increased use by self-contained groups in grades 1-3.	5	1

SAFETY (CONTD)

Item	Comment	Possible Points	Modified Point Difference
6.	Separations are more important now because of unscheduled times which should made available to self-contained groups.	5	1
8.	This item is more important now because of irregular, possible use by self-contained groups and a desire to improve safety of school plants generally.	5	1
13.	Be more critical of this item because of: (1) a desire to eliminate hazardous conditions (SP-1a), (2) replacement of both obsolete and educationally incomplete buildings (SP-1c), and (3) completion of other educationally incomplete buildings (SP-1d).	5	1
14.	Evaluate this item more closely because of the desire to eliminate hazardous conditions (SP-1a) and completion expectations of other educationally incomplete buildings. (SP-1d)	5	1
15.	Evaluate this item more critically because of the desire to eliminate hazardous conditions such as narrow wooden stairwells. (SP-1a)	5	1
17.	A more careful examination of this item is required because of the desire to eliminate hazardous conditions and complete educationally incomplete buildings. (SP-1a,b)	5	1
18.	Be more critical in the examination of this item because of the desire to eliminate hazardous conditions. (SP-1a)	3	1
19.	Be ultra critical on this item because of the desire to eliminate hazardous conditions (SP-1a,b,d) and the recommendation to replace plants where a fire hazard cannot be eliminated.	10	3
20.	Evaluate this item more critically because of desire to eliminate hazardous conditions. (SP-1a)	5	1

SAFETY (CONTD)

Item	Comment	Possible Points	Modified Point Difference
21.	Be more critical in the examination of this item because of the desire to eliminate hazardous conditions. (SP-1a)	2	1
	IV HEALTHFULNESS		
1 and 2.	Be more critical in the examination of this item because of increased stress on mental health.	10	2
6.	Examine this item more closely because of: a. Increased numbers of self-contained rooms. b. Desire to emphasize adaptation to changes in program. (SP-17) c. Allocation of specific amounts of funds annually for repair of instructional equipment. (SP-12)	10	2
8.	Evaluate this item closely because of the increased numbers of self-contained rooms; and the Detroit criteria of two fountains per 5 to 7 classrooms.	5	1
9.	Evaluate this item in light of the adequacy of toilet facilities for self-contained rooms.	10	1
	V ACCESSIBILITY		
1.	Be more critical of this item because of the ideals of 600-800 pupils per plant and 30 pupils per classroom.	20	2
2.	Be more critical of this item because of the ideals of 600-800 pupils per plant and 30 pupils per classroom.	25	2
4.	Examine this item more closely in light of group self-contained rooms and kindergartens near playground exits.	10	2

ACCESSIBILITY (CONTD)

Item	Comment	Possible Points	Modified Point Difference
7.	This item becomes more important with self-contained classrooms and the frequent movement outdoors.	10	1
8.	Examine this item more closely because of the increasing use of audio-visual aids to intensify programs and the experiments with television.	10	2
	VI FLEXIBILITY		
1.	This item becomes more important because of the intensified programs; self-contained rooms; a desire to increase adaptability and flexibility of school plants. (SP-17)	15	2
2.	Evaluate this item more critically because increased community use of plants and the increased emphasis on human relations.	10	2
3.	Examine this item quite closely because of the necessity to group self-contained rooms together and the increasing stress on flexibility in the erection of plants. (SP-17)	10	2
5.	Be more critical of this item because of the intensified program and the increased number of self-contained rooms.	10	2
6.	This item should gain more critical examination because of the increased importance displayed in encouraging individual control of classroom temperatures. (24)	10	1
7.	Examine this item more closely because of the desire to increase flexibility within school plants. (SP-17)	10	2
9.	Examine this item more closely because of the increased emphasis on flexibility and adaptability within school plants. (SP-17)	15	3

VII EFFICIENCY

Item	Comment	Possible Points	Modified Point Difference
1.	Evaluate this item more critically because of a desire to complete the educationally incomplete plants (SP-1d) and because of the increased number of self-contained rooms.	10	1
4.	This item is now more important because of the increasing emphasis made upon a more positive learning climate, increasing emphasis on mental health, and increasing community use of school plants.	5	1
5.	Evaluate this item more critically because of the need to group self-contained rooms and kindergartens near an outdoor exit.	7	1
6.	Be ultra critical of this item because of: a. Self-contained rooms and kindergartens grouped together. b. No basement area is "conducive to learning." c. An office is desired for the assistant principal. d. decentralization of library. e. Elimination of non-fire resistant facilities in second story plants.	15	4
7.	This item becomes more important and critical because of the elimination of hazardous conditions. (SP-1a)	7	2
9.	Evaluate this item more closely because of increasing use of plants by the community and the increasing emphasis on human relations.	3	1
11.	Evaluate this item more critically because an intensified program and the desire to make the school a more desirable learning environment.	10	1
12.	Examine this item more closely because of the desire to intensify the program and decentralize the library.	10	2

EFFICIENCY (CONTD)

Item	Comment	Possible Points	Modified Point Difference
13.	Evaluate this item more closely because of the desire to improve mental health and provide an environment conducive to learning.	10	1
	VIII ECONOMY		
2.	Examine this item more critically because of the activities conducted within the self-contained rooms.	5	1
3.	This item becomes more important with increased use of the building by the community and the decentralizing of heating in clusters of classrooms.	10	2
5.	This item becomes more important because of increased community activities and the elimination of hazardous second stories of plants.	15	2
6.	Evaluate this item more closely because of the increased night use of school plants by the community.	5	1
7.	Examine this item more closely because of the increasing importance of mental health and the increasing emphasis on a healthy environment for learning.	20	2
8.	This item becomes more important when the emphasis is directed toward better grouping of classrooms.	10	1
9.	Evaluate this item more closely because of the elimination of hazardous second stories; the effects of basements on mental health; and the erection of clusters of classrooms.	15	2

IX EXPANSIBILITY

Item	Comment	Possible Points	Modified Point Difference
1.	This item becomes more important because of the desire for larger sites, greater adaptability, and an increased number of self-contained rooms.	15	3
2.	Evaluate this item more critically because of the desire for greater adaptability, larger sites, and an increased number of self-contained rooms.	10	2
3.	Examine this item more closely because of the ideal capacities of 600-800 pupils per plant and 30 pupils per classroom; and the the dedentralization of the library. Multi-purpose rooms are also being planned to replace gymnasiums.	10	2
4.	This item is more important for plants with a capacity smaller than 600 pupils. It is generally more important for all plants because of the increasing emphasis on flexibility of school plants.	15	3
5 and 6.	These items should be evaluated more critically because of the location of primary grades near kindergartens, the elimination of hazardous second stories, completing incomplete structures, and an increased emphasis on adaptability.	10	2
7.	Examine this item more closely because of an increasing emphasis upon flexibility and adaptability.	15	2
8.	Examine this item more closely because of an increasing emphasis upon flexibility and adaptability.	15	3

X APPEARANCE

1.	Examine this item more closely because of the increasing emphasis on mental health and community use of the school plants.	5	1

APPEARANCE (CONTD)

Item	Comment	Possible Points	Modified Point Difference
2.	Examine this item more critically because of the desire to create a more desirable learning environment, intensifying the program, and improving mental health.	15	3
3.	Examine this item more closely because of the increasing emphasis on improving mental health.	10	1
4.	Examine this item more closely because of the increasing emphasis on improving mental health.	20	4
5.	This item should be more carefully scrutinized because of the increasing interest in better school-community relations and the increasing emphasis on mental health.	5	1
6.	Evaluate this item more critically because of the increasing emphasis on adaptability, flexibility, and improved mental health.	10	2
7.	This item should be rated more critically because of intensifying programs, improving mental health, and flexibility desired in school plants.	5	1
8.	Evaluate this item more critically because of increasing community use of plants and increasing emphasis on improving mental health.	10	2
9.	Examine this item more closely because of the desire to improve the learning environment and status of mental health.	15	3
10.	Evaluate this item more critically because of the provision for an annual allowance to repair instructional equipment, increasing the emphasis on mental health, and increased community use of school plants.	5	1

APPENDIX D

STATISTICAL FORMULAE

This Appendix contains the statistical formulae utilized in this study.

I. Formula utilized in Tables 2 and 3.

A. Testing if $\sigma_1^2 = \sigma_2^2$ by F

B. Formula:

$$\frac{S_L^2 (N_L - 1)}{S_s^2 (n_s - 1)} = F_{(n_L - 1,\ n_s - 1)}$$

C. Computation of Total Sample in Table 2:

$$\frac{17{,}973.29}{15{,}460.03} = F_{(14,14)} = 1.16$$

II. Formula utilized in Table 4.

A. Assuming $\mu_1 = \mu_2$

B. Formula:

$$t = \frac{\bar{d} - 0}{\sqrt{\frac{S_d^2}{n}}}$$

II. Formula utilized in Table 4 continued.

C. Computation of Total Sample:

$$\frac{71.933}{\sqrt{\frac{421.066}{15}}} = 13.57$$

III. Formula utilized in Tables 5 and 6.

A. Let $d_1, d_2 \cdots d_n$ be the n_1 difference from the first set of matched pairs. Let M_d be the population difference.

Let $r_1, r_2 \cdots r_n$ be the n_2 differences from the second set of matched pairs. Let M_r be the population difference.

Let:

$$\bar{d} = \frac{\sum_{i=1}^{n_1} d_1}{n_1} \qquad s_d^2 = \frac{\sum_{i=1}^{n_1} (d_1 - \bar{d})^2}{n_1 - 1}$$

$$\bar{r} = \frac{\sum_{i=1}^{n_2} r_1}{n_2} \qquad s_r^2 = \frac{\sum_{i=1}^{n_2} (r_1 - \bar{r})^2}{n_2 - 1}$$

III. Formula utilized in Tables 5 and 6 continued.

B. Formula:

$$t = \frac{\bar{d} - \bar{r}}{\sqrt{\frac{1}{n_1} + \frac{1}{n_2}}\ S_p}$$

where $$S_p^2 = \frac{(n_1 - 1)\ S_d^2 + (n_2 - 1)\ S_r^2}{(n_1 - 1) + (n_2 - 1)}$$

and D. F. = $n_1 + n_2 - 2$

C. Computation:

$$\frac{77 - 57.4}{\sqrt{.40}\ \sqrt{\frac{2384 + 685.2}{8}}} = 1.58$$

APPENDIX E

RANKS OF DIFFERENCES

This Appendix is essentially a long table of ranks. The ranks indicate the point values of a difference between the Base and Modified Programs. The ranks listed below are on the basis of points for all school plants in this study. Supplementary ranks by the sub groups of "new", "middle-age", and "old" school plants are provided for contrast and comparison. The following key is provided which indicates abbreviations referring to functions measured by the instrument:

Adequacy.....	Ad	Expansibility.....	Ex
Accessibility....	Ac	Flexibility.....	F
Appearance.....	Ap	Healthfulness.....	H
Economy.....	Ec	Safety.....	Sa
Efficiency.....	Ef	Suitability.....	Su

Using this key, the first item below would be translated as, "Question Number 9 under Adequacy". All other items should be interpreted in a similar manner.

RANKING OF ITEMS CAUSING A DIFFERENCE BETWEEN THE BASE AND MODIFIED EDUCATIONAL PROGRAMS INCLUDING POINT SCORES BY ITEM FOR EACH GROUP AND THE TOTAL SAMPLE

Item	New Plant		Middle-age Plant		Old Plant		Total Plants	
	P.D.*	Rank	P.D. *	Rank	P.D.*	Rank	P.D.*	Rank
Ad 9	9	7	22	1	20	1	51	1
Ef 6	9	7	8	8	12	3	29	2
Ad 5	10	3.5	9	4.5	9	7	28	3

* P.D. - Point Difference

Item	New Plant		Middle-age Plant		Old Plant		Total Plants	
	P.D.*	Rank	P.D.*	Rank	P.D.*	Rank	P.D.*	Rank
Ex 4	11	1.5	8	8	8	11.5	27	4.5
H 9	10	3.5	7	12.5	10	4	27	4.5
F 9	11	1.5	5	27	9	7	25	6.5
Ap 4	1	60.5	10	2.5	14	2	25	6.5
Ac 4	9	7	8	8	7	16.5	24	8
Ac 8	7	12	9	27	7	16.5	23	9.5
Ap 2	4	35.5	10	2.5	9	7	23	9.5
F 3	6	16	8	8	7	16.5	21	11
Ac 7	6	16	7	12.5	6	23.5	19	14
Ad 7	9	7	6	18	4	44.5	19	14
F 5	7	12	6	18	6	23.5	19	14
Su 7	7	12	7	12.5	5	33.5	19	14
Su 29	5	24	8	8	6	23.5	19	14
Ap 9	5	24	5	27	8	11.5	18	17.5
H 6	4	35.5	5	27	9	7	18	17.5
Ex 3	6	16	7	12.5	4	44.5	17	19.5
Su 11	5	24	5	27	7	16.5	17	19.5
Ad 4	4	35.5	6	18	6	23.5	16	22
Ef 12	7	12	2	69.5	7	16.5	16	22
F 2	9	7	4	41.5	3	57	16	22
Ad 13	5	24	5	27	5	33.5	15	25
Su 14	5	24	5	27	5	33.5	15	25

* P.D. - Point Difference

Item	New Plant		Middle-age Plant		Old Plant		Total Plants	
	P.D.*	Rank	P.D.*	Rank	P.D.*	Rank	P.D.*	Rank
Su 20	7	12	5	27	3	57	15	25
Ec 3	5	24	6	18	3	57	14	29
Ef 5	5	24	4	41.5	5	33.5	14	29
F 7	5	24	4	41.5	5	33.5	14	29
H 8	5	24	4	41.5	5	33.5	14	29
Sa 19	2	48.5	6	18	6	23.5	14	29
Ap 6	0	105.5	4	41.5	9	7	13	35
F 6	4	35.5	4	41.5	5	33.5	13	35
H 1	2	48.5	4	41.5	7	16.5	13	35
Sa 6	4	35.5	6	18	3	57	13	35
Su 6	4	35.5	4	41.5	5	33.5	13	35
Su 27	5	24	5	27	3	57	13	35
Ap 8	1	60.5	4	41.5	8	11.5	13	35
Su 15	4	35.5	5	27	3	57	12	39
Ad 12	1	60.5	5	27	5	33.5	11	42
Ap 5	3	42.5	4	35.5	4	44.5	11	42
F 1	5	24	3	57	3	57	11	42
Su 17	5	24	1	83.5	5	33.5	11	42
Su 24	5	24	4	41.5	2	69.5	11	42
Ap 3	3	42.5	4	41.5	3	57	10	48
Ec 2	4	35.5	4	41.5	2	69.5	10	48
Ec 5	2	48.5	2	69.5	6	23.5	10	48

* P.D. - Point Difference

Item	New Plant		Middle-age Plant		Old Plant		Total Plants	
	P.D.*	Rank	P.D.*	Rank	P.D.*	Rank	P.D.*	Rank
Ec 9	1	60.5	3	57	6	23.5	10	48
Ef 7	2	48.5	2	69.5	6	23.5	10	48
H 2	1	60.5	1	83.5	8	11.5	10	48
Su 9	4	35.5	4	41.5	2	69.5	10	48
Ad 6	3	42.5	3	57	3	57	9	55.5
Ap 10	0	105.5	4	41.5	5	33.5	9	55.5
Ef 1	2	48.5	3	57	4	44.5	9	55.5
Ef 11	3	42.5	3	57	3	57	9	55.5
Ex 5	0	105.5	5	27	4	44.5	9	55.5
Sa 8	2	48.5	3	57	4	44.5	9	55.5
Su 3	2	48.5	4	41.5	3	57	9	55.5
Su 21	1	60.5	4	41.5	4	44.5	9	55.5
Ad 8	1	60.5	3	57	4	44.5	8	61
Ap 1	1	60.5	2	69.5	5	33.5	8	61
Ec 7	0	105.5	6	18	2	69.5	8	61
Ex 1	2	48.5	3	57	2	69.5	7	63.5
Su 13	1	60.5	3	57	3	57	7	63.5
EF 9	1	60.5	3	57	2	69.5	6	66.5
Sa 18	1	60.5	2	69.5	3	57	6	66.5
Su 8	0	105.5	2	69.5	4	44.5	6	66.5
Su 25	4	35.5	2	69.5	0	118	6	66.5
Su 10	0	105.5	4	41.5	1	84	5	69
Ad 3	1	60.5	2	69.5	1	84	4	74

* P.D. - Point Difference

Item	New Plant		Middle-age Plant		Old Plant		Total Plants	
	P.D.*	Rank	P.D.*	Rank	P.D.*	Rank	P.D.*	Rank
Ap 7	1	60.5	0	116.5	3	57	4	74
Ex 6	0	105.5	3	57	1	84	4	74
Ex 8	0	105.5	3	57	1	84	4	74
H 7	0	105.5	1	83.5	3	57	4	74
Sa 10	0	105.5	0	116.5	4	44.5	4	74
Su 18	0	105.5	3	57	1	84	4	74
Su 22	1	60.5	2	69.5	1	84	4	74
H 5	0	105.5	2	69.5	2	69.5	4	74
Ac 5	0	105.5	2	69.5	1	84	3	80.5
Ex 2	1	60.5	1	83.5	1	84	3	80.5
Sa 3	0	105.5	1	83.5	2	69.5	3	80.5
Sa 15	0	105.5	1	83.5	2	69.5	3	80.5
Ad 10	0	105.5	1	83.5	1	84	2	86.5
Ad 17	0	105.5	1	83.5	1	84	2	86.5
Ec 6	0	105.5	1	83.5	1	84	2	86.5
Ef 4	0	105.5	1	83.5	1	84	2	86.5
Sa 1	0	105.5	2	69.5	0	118	2	86.5
Sa 5	0	105.5	0	116.5	2	69.5	2	86.5
Sa 14	0	105.5	1	83.5	1	84	2	86.5
Sa 20	0	105.5	1	83.5	1	84	2	86.5
Ec 4	0	105.5	1	83.5	0	118	1	95.5
Ef 10	0	105.5	1	83.5	0	118	1	95.5
Ef 13	0	105.5	0	116.5	1	84	1	95.5

* P.D. - Point Difference

Item	New Plant		Middle-age Plant		Old Plant		Total Plants	
	P.D.*	Rank	P.D.*	Rank	P.D.*	Rank	P.D.*	Rank
Ef 7	0	105.5	1	83.5	0	118	1	95.5
F 8	0	105.5	1	83.5	0	118	1	95.5
H 4	1	60.5	0	116.5	0	118	1	95.5
Sa 11	0	105.5	0	116.5	1	84	1	95.5
Su 12	0	105.5	0	116.5	1	84	1	95.5
Su 23	0	105.5	0	116.5	1	84	1	95.5
Su 28	0	105.5	0	116.5	1	84	1	95.5
Ac 1	0	105.5	0	116.5	0	118	0	130.5
Ac 2	0	105.5	0	116.5	0	118	0	130.5
Ac 3	0	105.5	0	116.5	0	118	0	130.5
Ac 6	0	105.5	0	116.5	0	118	0	130.5
Ad 1	0	105.5	0	116.5	0	118	0	130.5
Ad 2	0	105.5	0	116.5	0	118	0	130.5
Ad 11	0	105.5	0	116.5	0	118	0	130.5
Ad 14	0	105.5	0	116.5	0	118	0	130.5
Ad 15	0	105.5	0	116.5	0	118	0	130.5
Ad 16	0	105.5	0	116.5	0	118	0	130.5
Ec 1	0	105.5	0	116.5	0	118	0	130.5
Ec 8	0	105.5	0	116.5	0	118	0	130.5
Ec 10	0	105.5	0	116.5	0	118	0	130.5
Ef 2	0	105.5	0	116.5	0	118	0	130.5
Ef 3	0	105.5	0	116.5	0	118	0	130.5

* P.D. - Point Difference

Item	New Plant		Middle-age Plant		Old Plant		Total Plants	
	P.D.*	Rank	P.D.*	Rank	P.D.*	Rank	P.D.*	Rank
Ef 8	0	105.5	0	116.5	0	118	0	130.5
Ef 14	0	105.5	0	116.5	0	118	0	130.5
Ef 15	0	105.5	0	116.5	0	118	0	130.5
F 4	0	105.5	0	116.5	0	118	0	130.5
H 3	0	105.5	0	116.5	0	118	0	130.5
H 10	0	105.5	0	116.5	0	118	0	130.5
H 11	0	105.5	0	116.5	0	118	0	130.5
H 12	0	105.5	0	116.5	0	118	0	130.5
Sa 2	0	105.5	0	116.5	0	118	0	130.5
Sa 4	0	105.5	0	116.5	0	118	0	130.5
Sa 7	0	105.5	0	116.5	0	118	0	130.5
Sa 9	0	105.5	0	116.5	0	118	0	130.5
Sa 12	0	105.5	0	116.5	0	118	0	130.5
Sa 13	0	105.5	0	116.5	0	118	0	130.5
Sa 16	0	105.5	0	116.5	0	118	0	130.5
Sa 17	0	105.5	0	116.5	0	118	0	130.5
Sa 21	0	105.5	0	116.5	0	118	0	130.5
Su 1	0	105.5	0	116.5	0	118	0	130.5
Su 2	0	105.5	0	116.5	0	118	0	130.5
Su 4	0	105.5	0	116.5	0	118	0	130.5
Su 5	0	105.5	0	116.5	0	118	0	130.5
Su 16	0	105.5	0	116.5	0	118	0	130.5

* P.D. - Point Difference

Item	New Plant		Middle-age Plant		Old Plant		Total Plants	
	P.D.*	Rank	P.D.*	Rank	P.D.*	Rank	P.D.*	Rank
Su 19	0	105.5	0	116.5	0	118	0	130.5
Su 26	0	105.5	0	116.5	0	118	0	130.5
Su 30	0	105.5	0	116.5	0	118	0	130.5

* P.D. - Point Difference

APPENDIX F

SCHOOL PLANTS INCLUDED IN THE STUDY

The following chart depicts a description of the elementary school plants examined in this study. The chart was prepared by the year of plant erection, not any rating connected with the study.

Plant	Year Erected	Years of Additions	Site Size (In acres)	Number of classrooms	Sept, 1959 Enrollment
Old:					
A	1887	1899	1.29	13	600
B	1889	1914	1.07	12	581
C	1892	1908, 1917	1.80	24	1,181
D	1895	1898	1.26	16	770
E	1906	1914	1.63	20	1,127
Middle-age:					
A	1921	1925, 1929	5.20	37	1,470
B	1924	None	.99	14	591
C	1925	1926	3.68	29	1,366
D	1928	None	1.51	15	804
E	1928	1930	2.67	33	958
New:					
A	1946	1950	3.86	21	886
B	1949	None	4.27	10	461
C	1950	1952	4.03	32	1,230
D	1953	1955	3.20	21	1,141
E	1955	None	2.28	28	1,291

(The data for the above was obtained from the records of the Archectural Planning Department, Board of Education, Detroit, Michigan)

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